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ORIGINAL ARTICLES.

CONCERNING SOME POINTS IN THE TREATMENT OF TYPHOID FEVER.*

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WITH regard to the treatment of typhoid fever, I wish to speak concerning diet, the use of cold and the employment of drugs. The following statements are for the most part based simply on personal opinion and experience:

Diet.—Notwithstanding severe criticism, milk remains the best article for the basis of a typhoid fever diet. It has been condemned as an excellent culture medium for the bacillus, scored because of forming indigestible curds, and accused of being responsible for fermentation and excessive tympanites. All of these consequences and faults can undoubtedly be attributed in varying measure to the exclusive milk diet, but the acknowledgement simply emphasizes the fact that no one article of food is at all times and under all circumstances the best and most suitable for a patient with typhoid fever. Many patients have gone smoothly and uneventfully through the whole course of the disease without taking a particle of nourishment other than milk, but the sameness of the diet becomes excessively monotonous and at times revolting. On the other hand, there are some persons who, I am satisfied, have an idiosyncracy for milk and will vomit it, or, if it is retained, will digest it with distress and difficulty.

By a gradual process of development I have come to include the following articles in the routine typhoid fever diet: The administration of milk may be much varied. Thus we may give milk, milk and mineral waters, buttermilk, koumyss, oyster and clam soup made with milk, milk made into soup by salting, peppering, and heating with a little butter, hot milk flavored with a little strong, black coffee, or cold with a small quantity of whisky, brandy, or rum, or a sprinkle of red pepper. The latter is liked particularly by patients who are in the habit of drinking spirits. It is understood that the stools are daily scrutinized for undigested curds. If such appear the milk may either be stopped, or diluted one-half with water, plain or mineral, or peptonized by the cold process. In every case, if the patient is accustomed to drinking coffee, tea (hot or iced) or cocoa, these are allowed once or twice daily. With many persons the prohibition of these accustomed beverages is a serious, and, I believe, an unnecessary and harmful deprivation. In all cases lemonade, orange juice or grape juice are not only allowed, but their use encouraged, unless there is a troublesome diarrhea. Mutton, beef, and chicken broths, bouillon, consommé, or other clear soups are also given in moderation, unless, as with fruit juices, the bowels are moving too freely. Albumen water, the whites of eggs, mixed with an equal or somewhat greater amount of cold water, strained through a cloth, acidulated with lemon juice, and flavored or not with spirits, is often useful. The white of the egg or the whole egg may be beaten with milk and employed, a little sparingly perhaps. Barley gruel, thin and well strained, is a good food and relished by some, especially if well salted. Plain ice-cream, water ices and jellies are, as a rule, unobjectionable. Lactose, sugar of milk, is a valuable force producer, and as it is both soluble and wellnigh tasteless, can be given to great advantage one or two, or more, ounces daily, dissolved in milk or water.

The foregoing list affords possibilities, not only in degrees of digestibility and nutritive value, but in variety, and the latter is of no small importance, except in those patients who are dull and delirious. The physician at each visit should carefully arrange the hours of administration, the amounts, the kinds, and the sequences of the nourishment to be given, writing it out in detail, if necessary. There is a distinctly better morale when the invalid's palate is consulted, even though the sense of taste be measurably blunted. It is doubtless often the case that in our anxiety to maintain the nutrition of the patient at its highest point we give more food than can be digested or utilized. A persistent feeling of gastric discomfort, or overfulness, nausea, tympanites, or, if the diet contains milk, the appearance of curds in the stools, should be the signal for alterations in the schedule of nourishment designed to correct the symptoms of imperfect digestion. The milk may be cut out altogether or lessened in amount, or diluted, or peptonized, or other fluid foods may be temporarily diminished in quantity or frequency. Cases have been known to do very well on water alone for several days.

Water should be given just as regularly as food. This, to me, is a matter of great importance, because it is an effectual and indispensable means for keeping the total daily output of urine not only up to, but above, the normal daily average. It has been shown that the kidneys are the most efficient excretors of typhoid toxins. The experiments of Ingelraus and Dehon on the toxicity of the urine in three groups of cases of typhoid fever treated respectively by warm baths, cold baths, and the ingestion of large amounts of water, are of much interest in this connection. The toxicity of the urine was least with the warm baths, and greatest in patients who drank large

* A portion of a paper read before the Brooklyn Medical Society.

quantities of water, proving very satisfactorily that elimination of toxins was better accomplished by increasing the excretion of urine than by cold or warm baths. Water should, therefore, be given systematically, 6 to 12 ounces, or even more, if it does not incommode the patient, every two hours. Except in the mildest cases it is also desirable to give by rectum, once or twice daily, half a pint to a pint of warm normal saline solution.

With regard to the use of solid food, I believe most firmly that it should not be allowed until three days of normal temperature have elapsed, and in particular that no meat should be given until ten days of freedom from fever have passed. No one will ever regret the observance of this rule; many have bitterly mourned its non-observance. I am very well aware of the good authority for the giving of solid food, not only as soon as the patient desires it, but even during the course of the fever. Nevertheless, I have seen too many recrudescences of fever, particularly after the too early taking of meat, to be shaken in this opinion. Not without cause did the term *febris carnis* come into being; moreover, when one has seen an autopsy or two where nothing intervened between the patient and a perforation but an almost transparent film of peritoneum forming the floor of a typhoid ulcer, he is apt to meditate upon the not unlikely consequences of the passage of a tiny spicule of bone from a mutton chop, or a sharp seed case from an apple, or perhaps a solid piece of imperfectly cooked, poorly masticated or ill-digested vegetable or meat.

After the third day of normal temperature milk toast or crackers softened in milk, soft boiled or poached eggs, boiled rice or rice pudding thoroughly cooked, jellies, ice cream, oysters, baked potato, in general a farinaceous and fluid diet, may be allowed. After the tenth day, chicken, beef, steak and chop may be added.

Hydrotherapy.—So far as personal observation may be trusted, it would appear that the routine use of the cold tub in typhoid fever is not so common now with many good men as it was a few years ago. This is so not alone from the fact that in private practice the method is so troublesome and expensive as to be practically unavailable in the majority of cases. Even in hospitals, with the ready outfit and ample supply of trained attendants, cold tubbing is by no means so frequently employed, so that this change in the therapeutics of typhoid fever, while sufficiently marked to be noticeable in papers and discussions, is not due simply to the practical difficulties of cold bathing. The mild cases, with fever not exceeding 102.5° F., do not require it; a majority of the severer cases get along not only very well, but distinctly better with gentler means; and in a measurable proportion of patients tubbed, the cold baths have to be omitted because of a lack of proper reaction, even though the technic of the bath is as perfect as the most minute attention to details of the best practice can make it. Personally for the robust, strong-hearted, full-blooded type of man or woman I still employ it from the beginning, when practicable; for others it is best to begin, and continue, if the results are satisfactory, with less heroic hydriatic procedures, which involve the minimum of physical and mental disturbance to the patient, reserving the right to shift to the cold tubbing if the end and aim of the use of cold water is not attained by the less disagreeable measures.

It should be distinctly understood that the reduction of temperature is not the main object of the hydriatic treatment in typhoid fever. On the contrary, lowering of the fever, although desirable and often a good gauge of the effect of the treatment, is of quite secondary importance to the tonic and stimulating effect of cold with friction, upon the heart and arteries, the respiratory tract, and the functions of the nervous system, as well as the increase of the urinary excretion and its toxicity. Cold with friction of the surface should be emphasized, as one without the other is of comparatively slight service in attaining the desired results, viz., to counteract the effect of the toxins upon the nervous system and increase their elimination and destruction.

For the application of cold the following methods can be commended. The details are important:

1. Cold Mitten Rub.—Required: A rather rough bath mitten, a bath thermometer, a vessel holding a gallon of water, reduced to a prescribed temperature by ice, a rubber sheet, a blanket, a linen or Turkish sheet, and a couple of towels. The rubber sheet covered by the blanket is placed under the patient, the body clothing removed, and the sheet placed over him. The face, head and neck are wet with cold water, or, in women, a wet napkin is placed over the face. The front of the thorax is then uncovered and the nurse, dipping her mittened hand into the water, rubs the surface vigorously until it is well reddened, frequently redipping the mitten in the water. When a good reaction of the skin is secured, the thorax is quickly rubbed dry with a towel. The remainder of the body is similarly treated, in order, right arm, left arm, anterior aspect of legs, then, the patient having been turned upon his face, the back, and posterior aspect of the legs. The mitten rub may be repeated at intervals of three to six hours when the fever reaches or exceeds 102.5° F.

For the first rub the temperature of the water may be 85° F., for the second 80° F., for the third 75° F. Usually 65° F. is the lowest temperature required, but the water may be reduced to 45° or 40° F. if greater stimulation is necessary. The cold mitten rub has given tonic effects quite as good as those of the cold tub with a very desirable minimum of disturbance to the patient. It has a very different action from ordinary sponging, in which the surface of the body is merely moistened with cold water, applied by a soft cloth, without friction.

2. Towel Bath of Baruch: For the employment of the towel bath, the bed is prepared as for

the mitten rub. Required are two linen towels, a large cup, a sponge, a basin of water at 85° F. and another at 70° F. The patient is turned upon his abdomen, a towel having been dipped in the 85° F. water, is, without wringing, laid smoothly over the entire back, gluteal regions and thighs, using both towels if one is not large enough. With the cup, the water at 70° F. is poured over a part of the back, *e.g.*, the upper left, and this part rubbed vigorously with the flat hand until the surface is felt to be warm, and another cup of water poured on followed by more rubbing. This may be repeated three times unless the part does not become warm. The remaining parts of the back and the thighs are gone over in a similar manner and carefully dried. The patient is then turned on his back and the procedure repeated over the anterior portion of the body and thighs. From time to time, as required, the water which has flowed upon the blanket is sopped up and removed with the sponge. According to indications the towel water may be reduced to 60° F. and the cup water to 50° F.

3. The Ice Rub: The ice rub is distinctly more vigorous in its action and like the cold tub requires discrimination in using. The bed having been prepared with the rubber sheet and blanket, the patient may either be wrapped in a sheet dipped in 85° F. water, or the wet towels may be used as in the towel rub. But instead of pouring water on, a part of the surface is rubbed with a flat, smooth piece of ice, held in a wash-cloth, followed by friction with the flat hand until it warms up. This is to be repeated until the part remains cool. The whole body is successively gone over in this manner, and carefully dried.

The first method, the cold mitten rub, will suffice for nearly all cases. If a more refrigerant and stimulatory procedure seems necessary, the towel bath may be used, and, finally, if required, the ice rub. The nurse should promptly stop the giving of any one of these hydriatic measures if the patient's teeth begin to chatter. Complaints of simple chilliness may be disregarded.

During the intervals between the cold rubbings, a wet compress to the abdomen is highly recommended by hydrotherapeutists, although I have seldom employed it. It is applied by cutting three thicknesses of old linen to fit the front of the body from the lower end of the sternum to the pubis, and wide enough to lap over the sides of the abdomen. This compress is dipped in water at 65° F., wrung out so as to be moist without dripping, and smoothly applied, the gown having been rolled up out of the way. The compress is now covered by a flannel binder, of a size sufficient to pass completely around the body, and to overlap the wet compress by an inch or more, above and below. It may be secured by safety pins in the ordinary manner. It is to be renewed every hour.

Prophylaxis Against Relapses.—Owing to some favorable statistical reports, for the most part from German sources, it is extremely desirable to employ certain preventive measures against relapses. These measures are based upon the reasonable ground that reinfection may occur from the outside, especially from the hands of the patient. In addition to cleansing the hands and arms with a disinfectant solution, the finger nails should be cut short, and the hands scrubbed twice daily, with soap and water, followed by two or three minute immersion in a warm 1-1,000 bichloride solution. In a limited number of personal cases, no relapses have occurred when this has been done. In fly-time sedulous care should be taken to keep flies from the patient by bed and window screens, and to keep food and utensils covered to avoid their contamination by these pestiferous insects. This precaution is in the interest, not only of the patient, but as well of the attendants and residents in the building.

Medicinal Treatment.—It is probable that most cases of typhoid fever are overmedicated. It is simply appalling at times, even in hospital service, to see the list of remedies grow in bulk, by almost imperceptible additions at each visit of the physician, and it may require considerable self-control not to yield to the natural impulse which urges one to relieve or to meet every indication, whether important or not, which may arise. This piling up of remedies is extremely apt to disorder the stomach and to cause certain incidental untoward and undesirable by-effects. Many cases of typhoid fever do best with little or no medication, but at the same time I have no sympathy with therapeutic nihilism, and in the face of gradual cardiac failure, pneumonic complications, intestinal hemorrhage or similar serious developments, no one need hesitate to employ heroic medication if it seems necessary. There is neither reason nor humanity in allowing a case to progress steadily toward a lethal ending without employing medicaments which have proved indubitably life-saving in many instances.

There are but two points in medicinal treatment of which I wish to speak—intestinal antisepsis and the checking of intestinal hemorrhage.

Few well-informed men now expect to accomplish anything in aborting typhoid fever by destroying the bacillus in the intestines. The proved presence of the germs in the blood and internal organs forbid any such anticipations. Nevertheless I am satisfied from clinical experience that the ordinary putrefactive and fermentative changes which take place in the intestinal tube can be favorably modified by antiseptics, and that in consequence excessive tympanites, always an event to be deplored and dreaded, is of much less common occurrence when suitable remedies are systematically employed. Among eligible intestinal antiseptics are salol, guiacol carbonate, creosote carbonate, zinc or sodium sulphocarbonate, bismuth, and turpentine. These may be given in moderate doses at intervals of four to six hours. An initial dose of calomel is desirable, and during the course of the disease, especially when constipation exists and the stools are fetid, small doses of calomel 1-5 to 3-5 gr. with 1-10 to 3-10 gr. of ipecac and a little sodium bicarbonate

have often proved of good service in lowering temperature and relieving general and gastro-intestinal discomfort. As a rule daily enemata are sufficient.

For the medical treatment of intestinal hemorrhage three remedies have proved to be of much value. The first two, which act by increasing the coagulability of the blood, are calcium chloride and gelatin; the third, an arterial constrictor, is the powdered suprarenal or its active principle, adrenalin. A pint or more of a 10-per-cent. solution of gelatin may be given in the twenty-four hours; 20 to 30 grains of calcium chloride every two to four hours; and 5 or more grains of the desiccated supranenal every four hours, up to half a dram in twenty-four hours. The results have been sufficiently encouraging in personal cases to make the administration of these remedies a routine measure, in preference to the opium, ergot and lead of former treatment. The use of moderate doses of opium or its alkaloids is always advisable in order to quiet the restlessness and excitement usually attending internal hemorrhage, and to sustain and regulate the action of the heart.

NOTE ON TYPHOID FEVER AND SCARLET FEVER WITH SPECIAL REFERENCE TO THE DIAGNOSTIC VALUE OF BLOOD CULTURES.*†

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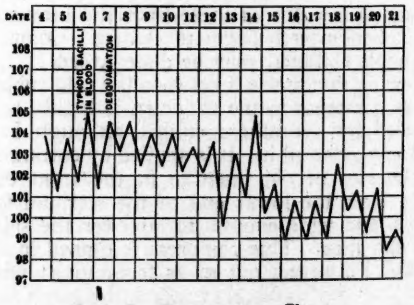
THIS brief communication is written for the purpose of calling attention to two points, first, the possibility of mistaking typhoid fever for scarlet fever on account of early rash and angina, as well as the possible coincident occurrence of these two diseases in the same person; and, secondly, the value of bacteriological examination of the blood in determining in such cases the existence of typhoid fever.

Recent investigations have shown that in the early stages and during the height of the attack of typhoid and paratyphoid fever the specific bacilli occur in the blood so constantly and in such numbers that they are readily demonstrable by cultural methods. Such appears to be the case also at the beginning of relapses in typhoid fever (Schottmüller, Rüdiger). In many respects this is the most important recent advance in our knowledge of these diseases, and bacteriological examination of the blood according to the modern methods of several inoculations of 1 c.c. or so of blood into many times that quantity of medium constitutes the most valuable diagnostic measure of these fevers at the periods mentioned. Repeatedly have bacilli been demonstrated in the blood many days before the appearance of specific agglutinins.

According to Curschmann‡ the concurrence of scarlet fever and typhoid fever has been described by Taupin, Murchison, Glaser and Eichhorst. In Murchison's and Glaser's cases, scarlet fever seems to have developed in the second or third week of typhoid fever, and Curschmann remarks that most frequently in this association the development of scarlet fever is secondary. In the following case it is reasonable to believe that scarlet fever and typhoid fever developed very nearly at the same time. At all events, the onset, the angina, the rash, the tongue, and the desquamation were quite distinctive of scarlet fever; and the demonstration of typhoid bacilli and of specific agglutinins in the blood as well as the subsequent course of the disease leave no room for doubt as to correctness of the diagnosis of typhoid fever.

Case I (No. 185).—Woman, aged twenty-two years; married; housewife; was admitted to Dr. Baum's service in ward No. 26, Cook County Hospital, on October 12, 1902.

The history (Dr. Otradovec) states that she was taken suddenly ill three days before admission with nausea, malaise, headache, pain in the limbs. The throat began to swell, became red, and deglutition was difficult and painful. On the following day a rash appeared on the neck and body, spreading to the limbs and face. The examination at the time of admission showed a diffuse erythematous rash on the neck and body, face and limbs. There was a deep, subcuticular flush with raised points. The tonsils were enlarged and swollen, but without membrane; strawberry tongue. On October 14, cultures of the blood were made and the typhoid bacillus occurred in pure growth. The serum was then strongly agglutinating for typhoid bacilli. On October 15 it is noted that typical scarlatinal desquamation was going on. On October 18 the



CASE I.—Temperature Chart.

spleen was palpable; there were numerous raised spots on the abdomen; quite frequent bleeding from the nose; headache persisted; the bowel movements frequent.

Recovery took place after a typical typhoid course, the temperature falling to normal about the twenty-first day.

It must be granted that the skeptic might find room for questioning the correctness of the diagnosis of scarlet fever in this case. As stated,

* From the Memorial Institute for Infectious Diseases.
† Presented at the meeting of the Association of American Physicians, May, 1903, Washington, D. C.
‡ Nothnagel's Specielle Pathologie u. Therapie, 1898, III B., I Theil, 303-304.

the onset, the angina, the rash, the tongue, and the desquamation seemed distinctive of scarlet fever, but in the absence of absolutely conclusive evidence, such, for instance, as would be furnished by the demonstration of the etiological agent, one could not successfully disprove the claim that all the symptoms were caused by the typhoid fever. But general desquamation does not seem to occur, at least in the lighter forms of typhoid erythema. In his valuable paper on "Anomalous Eruptions in Typhoid Fever," the late Da Costa* states that the scarlatiniform eruption in typhoid passes away without desquamation. The occurrence of desquamation in this case seems to be, therefore, to support strongly the diagnosis of scarlet fever.

It may have been cases of this kind that gave rise to the following description by Thomas of "scarlatina with a course similar to typhoid fever," which I give word for word with Von Jürgensen's comments, as translated in the American edition of the latter's work on scarlet fever in Nothnagel's system:

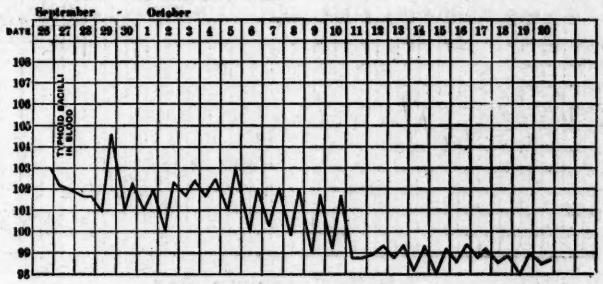
"By no means seldom occurs still another form of the disease, characterized by slight or moderate localizations, and by disproportionately severe and very long-drawn-out fever. The latter feature, together with the considerable intensity of the pyrexia, warrants the term 'scarlatina, with a course similar to typhoid fever.'

"Evidently in this form the fever is of major, and the local affection of minor, importance, although at times nothing more than a protracted local disturbance appears to cause the continuation of the fever into the fourth week and longer.

"The *eruption* in this form of scarlatina appears usually after a hyperpyrexia of several days' duration, which follows a sudden initial fever. It is often unusually slight; otherwise it develops according to rule. The *angina* is second in importance of the local affections, and is also frequently of no consequence. It is, as rule, present in advance of the exanthema. Notwithstanding these facts, *brain symptoms and fever*, especially in the beginning of the disease, are not infrequently quite marked; the expression is vacant, thirst severe, and the tongue tends to dryness, yet clearing itself in a characteristic manner. Some cough may be present, and the skin, which, after the fading of the exanthema has desquamated as usual, remains dry and hot. Later the patient is apathetic, and in addition to some slight affection of the organs of hearing, is usually deaf. The spleen swells somewhat, *hypostasis may occur in the lungs*, and the bowel movements are of the nature of a diarrhea. As a rule, no local affection other than a moderate enlargement of the cervical lymphatic glands is perceptible in connection with the remittent fever of weeks' duration."

Von Jürgensen adds: "Nephritis may appear in the third week, and, according to Thomas, determines, when present, the character of the fever."

At the autopsies of the subjects dying in the latter periods of the disease one notes, it is stated, besides the usual involvement of the pharynx, the lymph glands, the skin, and perhaps also the kidneys, "hyperemia of the brain, slight turbidity of the meninges, catarrh of the air-passages and pulmonary hypostasis, transudations into the serous cavities, the liver and spleen full of blood and often swollen, marked floccular involvement of the intestinal tract, and infiltration of its mesenteric lymph glands; sometimes also Peyer's patches are swollen in a manner rather similar to typhoid fever. It is by no means certain that in these cases there is a real complication with enteric fever."



CASE II.—Temperature Chart.

The last remark by von Jürgensen, it would seem, probably does not state the case correctly—it may well be that in some at least of these cases there is a real complication with typhoid fever.

Jochmann* reports a secondary infection with a paratyphoid bacillus in a girl, aged seven years, with undoubted scarlet fever, ending in death on the sixteenth day. Cultures from the blood on the fifteenth day gave a few colonies of streptococci and numerous colonies of paratyphoid bacilli. This result was obtained again after death. There were no special intestinal lesions. In this case there seems to be little or no reason to doubt the diagnosis of scarlet fever—the onset was sudden with vomiting and tonsillitis followed by a pronounced eruption, marked enlargement of the cervical glands, and on the ninth day desquamation.

In the two other cases that I report are prob-

* Transactions American Association of Physicians, 1899, XIV, 89-98.

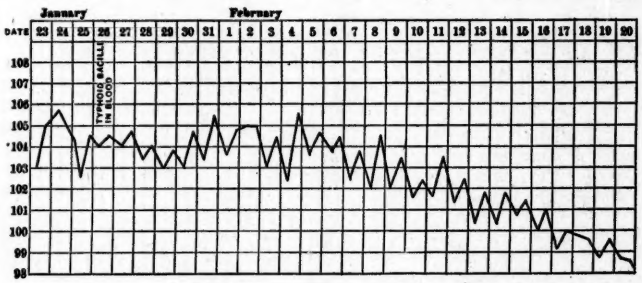
* Centralbl. f. Bakt., Referate, 1903, XXXIII, 8-9.

ably instances of early angina and erythema in typhoid fever.

Case II (175).—E. G., single woman, aged twenty-six years, suffered from headache and backache for three or four days, feeling now chilly and then again warm. On the fifth day she remained in bed; about this time she noticed a distinct rash, and there was pain in the throat. With this history she was brought to the Hospital of the Memorial Institute for Infectious Diseases and admitted by the interne as a case of scarlet fever. At the time of admission there was a faint rash on the chest. The cultures of the blood showed pure growths of the typhoid bacillus, which was agglutinated by the patient's serum. This serum also agglutinated in high dilution stock cultures of typhoid bacillus. The patient was transferred to the Presbyterian Hospital and passed through an uncomplicated attack of typhoid fever of moderate severity, ending in recovery. *There was no desquamation.*

Case III (238).—J. E., trained nurse, aged twenty-seven years; entered ward 26, Cook County Hospital, Jan. 23, 1902, with diagnosis of scarlet fever. According to the history (Dr. Snyder), the illness began rather suddenly, although the patient had not been feeling wholly well for some time before, becoming easily tired and not having as good an appetite as formerly. This she traced to her being on night duty. The actual onset of the attack is described as marked by headache, backache, and prostration. This continued for fully two days, during which she remained on duty, but in the evening of the second day she was forced to go to bed on account of the intensity of headache and backache; there were now present also anginal symptoms; the face was flushed, and there was noted by the nurse who looked after the patient a generalized erythema, which seemed to be typically scarlatinal. The pharynx was congested, but there was no membrane. The temperature at this time was 103.8° F. On the following morning (Jan. 23) she entered the service of Dr. Baum, in ward 26. Examination showed a well-nourished and well-developed young woman; she is somewhat exhausted, but not in any special distress and clear mentally. On the neck and chest is a diffuse red rash with punctiform spots. Mouth and lips dry, tongue brownish, fissured. Tonsils prominent, faucial pillars congested, no membrane. The cervical glands appear a little large. Thoracic organs apparently normal. The patient complains of tenderness on palpation of the abdomen, most marked in the iliac region; the abdominal walls are somewhat rigid. Spleen not palpable. Blood cultures were made Jan. 26, three days after admission, five drops of blood being added to each of two flasks containing 50 c.c. plain bouillon. In both there developed pure growths of typhoid bacillus. This bacillus was agglutinated by typhoid serum. A few days later the patient's serum was found to agglutinate typhoid bacilli. The patient passed through a severe attack of typhoid fever, ending in recovery. She *did not desquamate.* The patient gave a history of measles and whooping-cough and exposure to scarlet fever when a child while an older sister was sick with that disease; but the mother does not think that she had any eruption.

In these two cases I have taken it for granted that there was not sufficient evidence in either one to warrant the diagnosis of scarlet fever. Yet, if we assume that mild cases of scarlet fever occasionally may not be followed by desquamation



Case III.—Temperature Chart.

the claim that in both these instances it actually concerned scarlet fever associated with typhoid fever perhaps could not be disproven with absolute success. So long as it is not possible to place the diagnosis of scarlet fever upon an absolute etiological basis there always must be more or less room to question the real nature of scarlatiniform diseases, especially in patients not giving a clear history of previous attacks of typical scarlatina.

In neither of these cases was it possible to obtain any information of the use by the patients of any drugs that might have caused the misleading rashes.

Text-books in general mention the occasional presence of erythema in typhoid. Osler says: "It is not very uncommon in the first week of the disease to find a diffuse erythematous blush—E. typhosus. Formerly we thought it might be due to quinine."* Eichhorst† cautions against mistaking the diffuse typhoid erythema occasionally seen on the chest and abdomen, more rarely on the extremities, for scarlatina. This mistake

* Osler, fourth edition, 1902, p. 17.
† Handbuch, 1891, IV, 382.

he says is especially likely to occur when angina* is present. According to Curschmann,† Jenner (who mentions a case of typhoid fever mistaken for scarlet fever), Raymond, Le Maigre, and others, have described scarlatiniform eruptions in typhoid fever. These eruptions Curschmann is inclined to regard as medicamentous in nature.

But the most important statement that I know of concerning scarlatiniform and other anomalous rashes in typhoid fever is the aforementioned article by Da Costa. He points out that the scarlatiniform rash may remain throughout the fever, but this is rare; it may come out late, even in convalescence, and return in relapse; for the most part it is connected with angina. It passes away without desquamation. "Save under the exceptional circumstances of attending sore throat and desquamation there is no difficulty in determining the two diseases, or in diagnosticating that scarlet fever is not intercurrent in typhoid." Da Costa also discusses a more uncommon measles-like rash in typhoid fever, and details a case of the intercurrence of true measles in typhoid. Finally he mentions the combination and interchangeability of the scarlatiniform and the measles rashes in enteric fever.

The special point that I wish to emphasize again is that the practically constant presence of typhoid bacilli in the blood in the early stages, during the height, and at the beginning of relapses of typhoid fever, renders it possible by the use of proper cultural methods to settle promptly the diagnosis of typhoid fever in peculiar cases like those just reported. The indications are that this statement also holds true in paratyphoid fever.

TYPHOID FEVER IN INFANCY AND CHILDHOOD.‡

BY J. P. CROZER GRIFFITH, M.D.,
OF PHILADELPHIA.

THERE has been created in recent years a large literature in medical journals and text-books treating of typhoid fever in infancy and early life. Over my own signature there have appeared a few contributions on the subject, and I have but little new to add to these. It has seemed best to me, therefore, to make little, if any, direct reference to the contributions of individual writers, since this would consume far more time than the limited amount at my disposal, but, dwelling only on the peculiarities of the disease as seen in early life, to give only a synopsis of what is generally admitted by writers, combined with the results of my own experience, which has been somewhat extended.

Etiology.—The cause of typhoid fever in infancy and childhood is, of course, the same as in later years, *i.e.*, the action upon the system of a specific infectious germ. The usual method of entrance, too, is the same, viz., by the intestinal tract, in the case of infants and children particularly emphasized by the number of milk epidemics which have been reported. A number of cases are recorded, however, in which the disease was clearly contracted in fetal life. Writing in 1898 (*Philadelphia Medical Journal*, October 15), I found in medical literature 10 cases which could properly be called *fetal typhoid* in the sense that a typhoid mother gave birth to a fetus stillborn or dying shortly after birth, the typhoid bacilli being recognized by modern methods. Later Morse added cases from literature to the list. Including such of these instances of fetal typhoid as have been born alive although dying shortly afterward, as well as those which have shown symptoms of the disease very shortly after birth and have recovered, Dr. Ostheimer and myself, in a recent article (*American Journal of Medical Sciences*, November, 1902), have published 23 cases collected from medical literature which have been considered by the reporters to be suffering from typhoid fever, and which may be called *congenital typhoid* fever. Not all of these are undoubted instances of the disease. In fact, some of them are more than doubtful. But a considerable number are unquestionable. In all these instances of fetal or congenital typhoid fever it is evident that the bacillus was acquired not in the ordinary manner, but by the way of the placental circulation.

As regards the influence of age on the production of the disease as acquired in the ordinary method, there has been of recent years much dispute. It is curious to notice the change which appears gradually to be creeping over the sentiments of the profession in this country on this point. In 1892 a paper was read by Christopher, before the American Pediatric Society, upon typhoid in early life. In the course of discussion the expression was almost unanimous that the occurrence of the disease in infancy was extremely rare. In 1900 Blackader read another paper before the Society on the same subject. It was evident in the discussion at this time that the earlier belief was becoming much shaken. Last year the paper already referred to was presented by Ostheimer and myself. A still further wavering in the opinion of the members seemed evident.

My own belief, as expressed in the article referred to, is that the disease is far less rare in infancy and early childhood than has been generally supposed. With the greater care in observation, and especially by the aid of the serum reaction, it has become evident that the immunity of infants is not so great. Not that cases at this period are by any means as frequent as later in life, but that they occur far too often to allow us to call the affection absolutely rare. We have detailed 18 personal cases, observed by ourselves, or, in a few instances, by colleagues and not published previously, of typhoid fever in children up to the age of 2½ years. Including these with others published in medical literature, we have collected 139 cases occurring in the first year of life. Add-

* The occurrence now and then of angina in the beginning of typhoid fever suggests that the tonsils may be one port of entrance of typhoid bacilli into the blood.
† Loc. cit., p. 114.
‡ Read before the New York Academy of Medicine.

ing the congenital cases, we have in all 162 cases in the first year. As before stated, some of these cases are doubtless mistaken diagnoses and are open to question, but in the large majority of instances there appears to be no reason to doubt the diagnosis.

The principal cause of the relative immunity in earliest life I believe to be chiefly, if not solely, the lesser frequency with which typhoid bacilli enter the gastro-intestinal tract. The breast-fed children naturally are largely exempt, and the very common practice of subjecting the food to a degree of heat destructive of the bacillus, prevents the occurrence of the disease in artificially-fed children. Yet, when in any case it appears impossible to the family or to the physician that infection could have occurred, we must not forget the practice, not as common as it should be with proper precautions, of giving infants *water* to drink.

Symptomatology.—As compared with the symptomatology of the disease as seen in adult life the two chief characteristics of typhoid fever in infancy and childhood are (1) the less typical onset and course, and (2) the tendency of nervous symptoms to overbalance intestinal ones. It is particularly in the first two years of life that we are liable to be misled. I have seen more than one case in the first year proven to be typhoid fever, yet without any of the cardinal symptoms being present. In general we may say that in infancy the disease is liable to be atypical in most particulars; in early childhood and the first part of later childhood it shows the usual symptoms greatly modified; while in the latter part of later childhood, say, from the age of nine to that of twelve years, the symptoms approach much more nearly to those of adult life. The description which follows applies especially to the disease as occurring in early childhood.

We may review briefly some of the important symptoms. The *onset* is frequently slow and insidious, even more so than in adult life. My experience in the Out-Patient Department of the Children's Hospital shows me every year children brought for a number of visits, feeling very little ill and quite able to walk to the Dispensary. It might be only after repeated visits that the finding of rose spots or enlarged spleen, or the discovery of a Widal reaction, would settle the question of diagnosis. Then the child would be sent home and ordered to be kept in bed, not because it felt ill, but because the physician wished it. These walking cases of typhoid are, I believe, far more common than in adults.

On the other hand, it is certainly true that the onset of typhoid is at times remarkably sudden in children. The temperature may rise quite rapidly and the attack be well under way in only a few days, the initial symptoms being sometimes remarkably severe.

Vomiting is a comparatively common initial symptom in childhood. This, the experience of most observers, corresponds with my own. Rarely does it give any great trouble at any time in the course of the disease, but I can recall one case fatal apparently from uncontrollable vomiting coming on later in an attack which had, up to that time, been rather mild.

Epistaxis is probably not as frequent as in adults. This has certainly been my own experience at least. In one instance, however, in a girl eight or nine years old, I saw it followed by death. Some degree of *cough* is common, with the presence of coarse mucous râles in the chest. I have not often, however, found the cough troublesome, as it not infrequently is during the initial symptoms of typhoid fever in adults.

As regards the state of the *bowels*, the statistics of the cases collected by Ostheimer and myself show that diarrhea is a not infrequent symptom of the disease occurring in the first 2½ years of life. In the 417 cases in our report diarrhea is said to have been present in but 113, yet it was doubtless present, but not referred to, in others. The frequency in infancy must certainly be due to the tendency which the intestine shows in early life to exhibit diarrhea, dependent upon even slight congestive conditions. In early childhood the infrequency of diarrhea is probably to be attributed to the well-known fact that ulceration is far less marked, as a rule, at this period than later in life. Even in later childhood diarrhea has certainly been in my experience a symptom giving comparatively little trouble. Yet, I have occasionally seen cases where it was a most troublesome and debilitating symptom, and some published statistics show it to be perhaps as common as constipation. It is a curious fact that during the present winter season diarrhea has been unusually prevalent in the cases in the Children's Hospital of Philadelphia. This may be due to the fact that the great majority of our cases this year have occurred in children of from eight to twelve years of age. In the 71 cases occurring in the Children's Hospital in 1901, analyzed by Hand and Walker (*American Journal of Medical Sciences*, June, 1902), diarrhea occurred in 27.

Abdominal Pain is not infrequent, but great tympanitic distress is, in my experience, unusual. It is only rarely that it requires special treatment.

Rose Spots are probably present in the majority of cases. The frequency with which these are found will probably depend on the carefulness with which they are repeatedly sought for. I doubt whether there is much difference in the frequency of occurrence in children, as compared with that in adults. I have seen the spots so thickly covering the body, including the face, in a child of five that the disease suggested measles, and I have seen an equal development in an adult male. The same statement is true of the discovering of *enlargement of the spleen*. The organ is probably always enlarged. It could be detected in the great majority of my cases. Regarding the *desquamation*, on which stress has been laid by Weill and others, although it has been very often observed in my cases, I have not

been able to convince myself that it was in any way characteristic.

As already stated, the *nervous symptoms* of typhoid tend to preponderate over the intestinal in children. This expresses a relation only, and does not mean that they are actually very marked. On the contrary, the coma, subsultus, dry, brown tongue, muttering delirium and other symptoms of the advanced typhoid state seen so often in adults are much less often observed in childhood. Only in those children not many years removed from puberty are these severe symptoms apt to be found. I have quite recently seen a child of eight years in which there was profound unconsciousness, muttering delirium and very dry tongue, in fact, the typical symptoms of the advanced typhoid state; but this is the only case which now comes to my recollection. There is generally a certain slight degree of apathy which is quite characteristic. A slight delirium, especially at night, is common. Headache is a frequent initial symptom, but not to the degree seen in adults. One form of nervous disturbance appears more apt to occur than in later life, viz., an initial wild delirium which strongly suggests meningitis. I have for a time been misled entirely in diagnosis by such an occurrence. In fact, the occurrence of a pseudomeningitis I believe to be much more frequent than in adult life. I have now under my care just such a case, in a girl of five years. The patient developed an obstinate convulsive state on the third day of recognized symptoms, and then passed into an unconscious condition. Meningitis appeared the most probable diagnosis, and only the Widal reaction made the true nature of the disease manifest.

As regards *renal* symptoms there is probably no difference as compared with those of adult life.

As to the *duration* of the attack and the course of the disease in general, the total average duration may be stated as from fourteen to twenty-one days, although often a little longer, the attack being generally severer and more prolonged in proportion as the child is older. Of course there are exceptions, and fever may continue even for five or six weeks. The temperature usually rises rapidly, remaining high with very little variation between the morning and the evening elevation. It falls much more rapidly than in adults, the intermittent temperature of the last portion of adult typhoid being generally much less marked, greatly curtailed, or entirely absent. In some cases the fall is almost critical in type. In infancy the temperature is liable to be exceedingly irregular. Not infrequently in childhood there is a tendency for a moderately irregular elevation of temperature to persist for, it may be, weeks after all other symptoms have disappeared. This occurs also in adults, as is well known, and, I believe, with about the same frequency.

Regarding the *pathological anatomy*, the spleen is always enlarged, and the mesenteric glands are liable to be much swollen. This latter has been regarded by some writers as especially characteristic of the disease in childhood. The solitary and agminated glands exhibit a decidely hyperplastic condition, the glands becoming pinkish and projecting above the lumen of the intestines; but there is, as stated, as a rule, a very much lesser tendency to ulceration. When ulceration does occur, it tends to be superficial only. This applies especially to infancy and early childhood, but is open to exception. In later childhood the tendency to ulceration increases, and I have seen it very extensive even in children of from six to eight years. This is, however, exceptional. It is probably due to the presence of less marked intestinal lesions that the course of typhoid fever is shorter in childhood, and that the temperature falls more rapidly. It is an interesting fact that in none of the cases of typhoid fever in the fetus which I collected was there any involvement of the intestine whatever.

Diagnosis.—The diagnosis in infancy is difficult. The irregular character of the pyrexia of typhoid fever at this time of life, the tendency for any catarrhal state of the intestine to be attended by fever and diarrhea, and the fact, proven by autopsies, that inflammation of the intestinal glands may attend equally well typhoid fever and enterocolitis, make it at times impossible to come to a satisfactory conclusion. The value of the Widal serum reaction is inestimable at this period of life. In later infancy and early and later childhood the diagnosis still offers difficulties. Meningitis is to be carefully excluded. As time passes this difficulty is generally removed, since the early meningeal symptoms sometimes present rarely continue. Enterocolitis can usually be distinguished after a little time. Influenza offers peculiar difficulties. There is in it, as in typhoid fever, the continuation of pyrexia without discoverable cause sufficient to explain it. A leucocyte count helps to a great extent in many conditions, but not in distinguishing between these two diseases. The development finally of a serum reaction settles the question, if the finding of rose spots and an enlarged spleen has not done so already. We must not feel, however, that the failure of the serum reaction to show itself is proof that typhoid fever is absent. The reaction may be very late in arriving. For instance, in one undoubted case occurring in the Children's Hospital it was not obtained until the twenty-seventh day.

Of the *complications* and *sequels* I have only a few words to say, and these are especially to emphasize the absence of some of them. The various other infectious diseases may occur simultaneously with or consecutively to typhoid fever. I have seen this true of scarlet fever, of diphtheria and of measles. Aphasia is a sequel said to occur oftener after typhoid fever in childhood than in adult life. Personally I have seen little of it. Posttyphoidal insanity is a rare sequel. I have seen it in but two cases. Some very interesting examples are reported in medical litera-

ture. Noma is an unusual complication seen in childhood. I have observed it in several instances. Intestinal hemorrhage is generally considered to be marked by its infrequency. This is especially true of infancy and early childhood. I have, however, seen it in the case of a five-months'-old patient. In later childhood it is more common, although much less so than in adults. Still we have it occurring not so infrequently in our Children's Hospital cases. It was present in 4 of the 71 Children's Hospital cases of 1901. Generally it is very slight, but I have seen it exceedingly severe in two cases in the last two winters. Perforation, too, is generally admitted to be of great rarity in childhood. This is undoubtedly true, and I have been peculiarly unfortunate in meeting it in 4 cases, in children of eight, ten, eleven and twelve years, respectively. One of these cases was operated on; two others came to autopsy; in one the diagnosis was practically positive, although operation was refused and no autopsy possible.

Relapse would appear to be about as frequent as in adult life. It varies, of course, with the epidemic, and with the individual experience of the observer. It occurred in 6, *i.e.*, 8.5 per cent., of the 71 Children's Hospital cases referred to.

The *prognosis* is, on the whole, good in children. Of 137 cases occurring during ten years in the Children's Hospital up to 1898 only 3 died, a mortality of 2.9 per cent. Doubtless there were many other cases which recovered, although unrecognized, the true diagnosis of which more recent methods would have made plain. In the years 1898 to 1902, inclusive, there were 295 cases, and of these 20 died, a mortality of 6.7 per cent. The total mortality in 432 cases was 23, a death-rate of 5.32 per cent. The mortality of the 278 cases of 2½ years and less in which the result is stated contained in the collection of Ostheimer and myself, was unusually high, equaling 51 per cent. This would appear to indicate that the number of fatal cases is exceptionally high at this period of life. I am convinced, however, that the figures are to a considerable extent misleading, as the unusually severe and especially the fatal cases are the ones physicians are most liable to report. However, of our 18 personal cases of 2½ years and less, 5 died, a mortality of 27.77 per cent. The number observed is, of course, too small to allow of any conclusions being drawn. Nevertheless, it tends to make me change my former view, and to regard typhoid fever in infancy as a distinctly dangerous disease. This, however, needs further study. In early childhood the prognosis of the disease is certainly good.

Treatment.—In the present method of making hydrotherapy practically the only therapeutics of typhoid fever, except purely symptomatic treatment, the question is a vital one as to how far the method applies to the disease as occurring in children. Although valuable, hydrotherapy must be used with much caution, and the method of Brandt, carried out in its exactness, is seldom applicable. In my experience the true cool or cold bath occupies but little place at this time of life. Children, as a rule, do not tolerate it well. This is especially true of younger children. Even the tepid plunge of 85° to 90° F., or the graduated bath, is often not well borne, even by older children. I have repeatedly had to abandon it on account of the weakness of pulse which it produced. My custom is to employ sponging first, since this is often quite sufficient. If it is not, then the graduated bath of 90° cooled down to 80° F. is employed. In some instances I have had excellent results from the warm tub bath of 95° to 100° F. In many instances I have found the application of an abdominal ice-bag extremely serviceable in reducing temperature.

It is noteworthy that very often sponging seems to do harm. In many such cases tubbing is to be preferred to sponging on account not only of its greater power, but especially of its shorter duration. To sponge a child for fifteen minutes who is crying and struggling violently meanwhile is of very questionable good. A brief immersion in the bath is often far less fatiguing to the patient.

We must remember that children, as a rule, not only develop high temperatures readily, but that they tolerate this unusually well. We can, therefore, in many cases, afford to let the temperature alone. Careful judgment must be employed, and hydrotherapy can never be used in children as a necessary routine. Although so valuable in many cases, it is, without the exercise of judgment, often capable of doing far more harm than good.

NOURISHMENT, MEDICATION, HYDROTHERAPY, AND GENERAL MANAGEMENT OF TYPHOID FEVER CASES.

BY W. T. BAKER, M.D.,
OF MIDLOTHIAN, TEXAS.

THE subject which I have selected is not by any means a new one, nor do I anticipate the giving to this enlightened body any new theories; but I wish to impress the importance of doing the things thoroughly well which we all know how to do and perhaps in a measure have done.

In the first place, according to our present knowledge, in typhoid fever we have a disease which is largely, if not entirely, a self-limited disease; one for which we have no specific medical or other antidote, or can by any other procedure limit the disease to a shorter period than three weeks, and in some cases longer. However, I do believe that, in a very large per cent. of our cases, we should limit the febrile course to three weeks or thereabouts—say, within twenty-five days. I shall not say that this or that thing is the *most important* to do for a typhoid fever patient; but rather that any and all things done should be most important, and if a thing is not important, why do it at all? Right here I wish to say, parenthetically, that there is a tendency upon the part

of the laity, if not the physician, to do unimportant things which many times are detrimental to our patients.

As I have indicated in the naming of my subject, there are four special divisions of it, which I shall mention in the order in which they are given in the subject heading, which begins with

Nourishment.—It is one thing to say what our patients shall eat, and another thing to get them to eat it. Then comes the all-important question of determining what they can eat with impunity and what is contra-indicated in an individual case. I have found that every case is individual in some respects, and should be treated as such. The old idea that typhoid fever patients should be fed on strained soups, buttermilk, malted milk, and such like is an erroneous idea and should be corrected. In the first place, they do not give a sufficient variety, are soon tired of, and are not very palatable; therefore, you cannot get the patient to take sufficient amount of these to get the desired amount of nourishment, and unless the patient will take the nourishment prescribed, it had as well not have been prescribed, so far as the results are concerned. Therefore, we must select something our patients can and will eat, and at the same time not be contra-indicated, and yet nourishing to our patient; for, as I stated at the first, it is *most important* that our patient should be kept well nourished. So I say to the nurse, feed the patient; give him buttermilk, most any kind of meat soups, plain or thickened with a little flour if desired; rice, oatmeal, wheatlet or any wheat preparation, XXX crackers, baker's bread in form of toast, with butter or softened with milk or hot water, or patient may eat it dry from the oven, chewing it up well and swallowing it with plenty of drinking water; a young chicken or a tender rabbit or bird made with soup, and cooked until very tender; most any kind of preserves or jelly, excluding the hard, lumpy portions, and things having seeds, such as blackberries; the syrup and the softer parts of canned fruits may be given, such as peaches or apricots; a baked apple; a well-ripe tomato, all but the skin and the hard core; an Irish potato that has been out of the ground long enough to be well dried out, and baked till it will mash up. All of these things which have been mentioned that require cooking, I recommend that they be thoroughly done before the patient should eat them, and, of course, should be seasoned according to taste. Now, from the things enumerated, you see I have a sufficient number to give a variety of nourishment; and from the whole some things can be selected which are to a certain degree palatable, or at least can be forced upon the stomach of most patients sufficient to accomplish a very good degree of nourishment; while, on the other hand, the absolute fluid diet soon tires the patient, and you fail to do the *most important* thing, viz., nourish your patient. I am aware that some may say that in my allowance of foodstuffs there is too much effete matter, that the bolus formed in the intestinal tract would do material harm to it as it passes through; but the facts in the case are (I think) to the contrary. As none of the articles I mentioned would become hard, dry masses in the intestinal tract, but would be soft, mush-like masses, which do not overdistend the bowels and do them harm, but to the contrary benefit them by wiping off the mucous membrane of the surface over which they pass, clearing off all discharges from the ulcerating patches, thus giving opportunity to get a local antiseptic or absorbent, or filling in effect of any drug which you may be administering, should you be fortunate enough to reach these ulcerating patches with such drugs. Also the frequent separation of one wall of the ulcerating gut from the other furnishes free drainage for the same, and these things prevent the ulcers from going so deep into the intestinal wall, as they no doubt would by laying one upon another, in doing this you often prevent hemorrhage; on the other hand, the gases which necessarily accumulate where such drainage has not been accomplished, will in many cases produce such distention of the bowels as to cause very serious and oftentimes fatal hemorrhage. So that, leaving out the question of palatability and nourishment altogether, I think, the effect on the bowels locally, from a mechanical point of view, is very much in favor of such things as will make an effete mass. When you come to the point of considering both nourishment and drainage, there can be no question as to the propriety and desirability of this plan of feeding. Then there is a humane side of this question: When patients are fed on liquid diet they become so emaciated that when the time does come for an appetite, some of them suffer inexpressible hunger, which cannot be satisfied, and their very bones and muscles cry out in pain for the needed nourishment; and should the patient get hold of something to eat his hunger is so great that he will not resist it, even though it be a thing that a well man ought not to eat. And then and there we have a relapse, which means a long and tedious spell for the patient and doctor, if not a funeral, whereas if the patient is well nourished all the way through, the fever period is shortened, the hunger is not so distressing nor uncontrollable. The patient gets right out of bed in a day or so after the fever is gone; takes the necessary exercise and fresh air and is soon well.

Medication is the second topic mentioned in my subject; and as I have disallowed of specifics in the outset, it will necessarily leave me to recommend the use of such drugs as will best meet the indications, as they appear from the time the patient is first seen. A large percentage of my patients need at first a good, thorough cleaning out; a stimulation of the secretions, and for this purpose I usually use the mild chloride of mercury with bicarbonate of soda, given in grain doses an hour apart until three or four are given, repeated the third or fourth night, as the indications may demand. I sometimes add podophyllin or rhubarb to this, especially if after

the first night I fail to get good results. If the fever is high and the patient is aching, as many of them do, I give them at first a prescription containing codeine, phenacetine, salol and quinine to last three or four days, to be given in daytime, continued through the night if the patient does not rest. In addition to this I give carbolic acid minims 1, tincture of iodine minims 2, and aqua drams 1, every four hours in daytime for its antiseptic effect, and this I continue throughout the fever period unless for some reason I need to give an absorbent, and then I give one that is also an antiseptic. I have used resor-bisnol with very happy results, or in case the carbolic acid and iodine are very distasteful to the patient, I use any other good antiseptic. When I have given enough quinine to be sure I have overcome all malaria and the pain has subsided so I can leave off the codeine and phenacetine, I continue the salol by giving about six grains, three times a day, together with bicarbonate of soda and about one-eighth grain of the mild chloride of mercury; this makes up my routine of dosage throughout the fever period with the addition of strychnine to the liquid solution, as soon as indicated by the pulse; thus you see, I have a capsule and a teaspoonful of the antiseptic solution every four hours in daytime. That is all the medicine my patient has to take, unless a dose to relieve pain, quiet nervousness, to produce sleep, or meet any such conditions which might arise and, of course, when I begin the use of strychnine, I arrange my antiseptic solution in dosage and time to suit it. Before leaving the subject of medication, I wish to say that I have read with interest some very favorable reports from the use of acetozone as an intestinal antiseptic in typhoid fever, as well as other intestinal troubles; but as yet have not tried it myself. However, I recommend a careful study of the reports of this new antiseptic and its adoption as soon as its virtues are proven superior to those now in use. I also have a hope that the serum treatment may prove a great success. I go into the details of my medication chiefly to show its simplicity and conservatism. I do not give drugs except to accomplish certain ends; and believe many times in an effort to cure the patient, very many doses and drugs are given which do the patient actual harm.

Hydrotherapy.—This is a most important part of the treatment, and I use it in all the ways with which I am acquainted, to accomplish the purposes for which it is indicated. Some of which are to quench the thirst, furnish water to the fever-dried tissues, to keep the temperature from reaching and remaining at a harmful height, thus preventing nervousness and delirium, and sustaining the heart, for all of which I prefer the water cold. I sponge them, plunge them, and pack them; usually preferring the latter; am not much in sympathy with the plan of pouring ice water over the head, to the neglect of the other portions of the body.

General Management.—This is the last theme mentioned in my subject, yet it is a very important part of the treatment. Much could be written upon this subject, but I shall endeavor to be as brief as possible to give you such ideas as I have in mind. First, if possible, I want a nurse that is strong enough in body and mind to carry out my instructions, one who does not *know all about nursing sick folks.* I want my patient fed at regular intervals, say about every two and a half to four hours in daytime and as often at night, if awake, but do not want them awakened to give nourishment as long as they are reasonably strong. I want the nurse to sleep in the room with the patient, but not to sit up with him as long as he is rational; and it is not necessary to sit up and give medicine or control fever. I want business matters and other things that are liable to worry kept away from him; do not want all the kin, the neighbors, their children and their dogs to call on him or stay about the place; want his bedding changed, in mild cases, every second day, or, if fever is very high, every twenty-four hours. The urine, effete matter and what he spits or vomits should be disinfected and removed from the room at once; the room kept well ventilated and cleaned, with plenty of light; quiet maintained day and night. The patient should know enough of the current happenings of the outside world to give him something to think of and keep him from being too lonesome or from thinking too much of business or other matters.

Now, in conclusion, I wish to say I have written as for the average case and patient which I vary according to the severity of case, and general surroundings. The dosage is for the average adult, children in proportion. Herewith I wish to give you a tabulated report of thirty-one cases treated after the plan outlined, which, I think, strengthens very materially the points which I have endeavored to make, and these cases are just as they came to me in my general practice.

From this report you will notice I have only had one case of hemorrhage; and it was a case where the patient had been treated for two weeks by a druggist with purgative pills and quinine. The patient had not remained in bed until after the hemorrhage, when I was sent for, which was five days before he died. You will also observe that there are only two deaths, one of these the case just mentioned; the other a case of reinfection, a girl, in which there were other complications, accounted for by her time of life. There were only two cases of reinfection, one of which, after having fever fifty-two days, got out of her bed, put on her clothes and walked across the floor through a hall and sat down at the top of a flight of stairs to talk; all of which she did without the aid of any one; this being the last day of fever; and the fourth day after the fever was gone, she went down stairs for her meals at her boarding house, and continued to do so thereafter. And before another month had elapsed she was in her place as teacher in one of the public schools of Dallas, where she has continued to teach until this time. Another one of my patients

was a young lady, eighteen years old, whose fever stopped on the twenty-first day; the third day after the fever left her she walked a distance of four blocks to where a new flour mill was being built, and in company with two other girls went into the basement and up a flight of skeleton stairs to the top of the fourth floor, and back again to town and back home, making in all an absence of about an hour, after which she said she was not very tired, and from which exercise there were no apparent bad effects. I did not know of this trip until after it was made, nor did I approve of it.

I make particular mention of these two cases to show how well the strength may be maintained by proper nourishment, even though they have high fevers and long fever periods. The young lady who took such a risk by going to the mill and to town, had a temperature running up to 104.5° F. for several days, though the most of the time 103° F. would represent the highest temperature; and the temperature of the other lady, specially mentioned in regard to her strength, reached 106° F. the second and third days after her relapse, which occurred on the twentieth day of her fever.

REPORT OF CASES.

Name	Sex	Age	Month	Called	Duration	Remarks
V. K.	Male	19	May	5	33 days	Complicated by hyperemic spleen
J. B.	male	26	June	4	28 days	
W. L. H.	male	6	June	5	21 days	
C. V.	male	38	June	4	23 days	
* *	female	7	June	3	21 days	
J. C. Mc.	male	49	July	1	21 days	
Mrs. W.	female	37	July	4	25 days	
W. W.	female	15	July	4	35 days	Complicated by malaria
C. C.	female	14	July	1	32 days	Died
N. B.	female	18	August	3	21 days	Walk to new mill, etc.
B.	female	14	August	1	20 days	
Jim C.	male	28	August	6	21 days	
H. D.	male	8	August	2	22 days	
C. H.	male	8	August	4	21 days	
C. H.	male	6	August	4	21 days	
J. M. L.	female	7	August	6	22 days	
C. B.	male	11	August	1	18 days	
C. B.	female	9	August	1	20 days	In school in one week
B. A.	female	8	September	4	23 days	
Miss C. G.	female	24	September	3	52 days	Reinfected on the twentieth day, temperature reaching 106°F. for two days; walked to stairs day fever broke; in four days went to meals from stairs.
B.	female	12	September	1	23 days	
B.	female	10	September	1	21 days	
M. M.	female	16	September	5	22 days	
C. W. S.	male	40	September	7	23 days	
J. H.	male	31	September	7	21 days	
B.	male	6	October	1	28 days	
J. T. M.	male	11	October	2	35 days	
C. C.	male	20	November	7	23 days	
M. B.	female	12	November	6	24 days	
W. G.	male	31	December	2	22 days	Very sick
Chas. L.	male	33	December	15	20 days	Died, result of hemorrhage

I trust I have not worried anyone by the statement of the details of my cases and their treatment. But on the other hand that I have impressed your minds with the necessity of liberal nourishment, restricted medication, abundant use of water, and strict carefulness in the general management of this kind of cases. I have never had a relapse or any discoverable discomfort from my feeding; on the other hand, when I have been unable to feed my patients as I desired I have observed a longer term of convalescence, and usually a lengthening of the fever period.

THE ETIOLOGY AND CHEMICAL PATHOLOGY OF GALL-STONES.

BY C. A. HERTER, M.D.,
OF NEW YORK.

(Continued from Page 536.)

Biliary Infection in Cholelithiasis.—The presence of bacteria in the bile of cholelithiasis patients is a very common but by no means regular occurrence. W. Peterson* in fifty operations for gall-stones found bacteria in the bile 44 times. In 36 instances the *Bacillus coli* was found, 6 times this bacillus was associated with the *Staphylococcus aureus*, and in 4 cases the *Streptococcus pyogenes* was the companion of the *Bacillus coli*.

These figures are probably fairly representative of the cases of cholelithiasis that call for operative interference, although no typhoidal infections happen to occur in Peterson's group of cases. It should be remembered, however, that the character of the gall-bladder infection does not necessarily represent the infective agent concerned with the production of the gall-stone, for it may happen that a stone referable to typhoid infection is the means of provoking a cholecystitis due to another organism, long after the original inflammation of the gall-bladder has subsided. Sometimes the bile is sterile, although stones taken from the same bladder contain living bacteria. On the other hand a stone from which no organisms can be cultivated is sometimes associated with bile from which bacteria can be grown.

Influence of Human Biliary Stagnation.—It has already been mentioned that an essential condition for the production of experimental cholelithiasis is some degree of impairment of the expulsive power of the gall-bladder. In the absence of such impairment it appears to be extremely difficult for bacteria to gain and maintain a foothold in the healthy gall-bladder. Myake found that ligation of the cystic duct does not lead to infection of the cystic bile, presumably because the unchecked bile flow into the intestine suffices to wash back entering bacteria and to limit their spread.† On the other hand ligation of the ductus choledochus was followed by infection of the cystic bile, because this operation which lies within the normal bacterial zone.‡ completely stops the bile stream to the duodenum. The results of Ehret and Stolz differ from those of Myake in regard to the consequences of ligation of the cystic duct. These ob-

*Brun's Beiträge, Bd. 23.

†Atrophy of the bladder from ligation of the cystic artery is a result of this operation.

‡According to Netter and Duclaux, in dogs and rabbits only the lower part of the ductus choledochus (near the papilla) is ordinarily inhabited by bacteria.

servers found that even after the cystic duct had been severed between two ligatures there was a pronounced increase in the number of organisms present in the bile.* As these organisms could not have come from the intestine it is necessary to assume that they arose from the multiplication of bacteria already present in the gall-bladder or possibly that they came from the blood. The eventual death of these organisms appears referable to their feeble powers of adaptation rather than to any increase of the bactericidal action of the bile.

Thus, it is likely that while the mere stagnation of the cystic bile may not always be followed by infection of the gall-bladder, such stagnation greatly increases the chance that bacteria will establish themselves in this locality. The information derived from experimentation upon animals makes it extremely probable that whatever causes cystic stagnation in man, increases the opportunity for infection and consequently of cholelithiasis. Among the conditions that lead to impaired expulsion of the cystic bile are the atrophy of the muscular coat of the gall-bladder and various mechanical agencies which obstruct the biliary passages. The increased liability to gall-stone in old age probably depends in a measure on the weakening of the muscular coat of the gall-bladder, but a diminished resistance of the body fluids to infectious agents is possibly another factor. The greater incidence of gall-stones in women has been attributed to the mechanical hindrance to the expulsion of bile from the gall-bladder caused by tight lacing. Probably tight lacing acts as such a hindrance, but it fails to explain the liability of the women who do not lace.

It is stated that in fever the gall-bladder is emptied with less completeness than in health, but the evidence in favor of this view is not satisfactory. That the gall-bladder is distended with excessively watery bile in many cases of typhoid fever is well known to pathologists, and it is highly probable that this overdistention is connected with a paretic state of the muscular layer. But it is much more likely that this is a result rather than a cause of infection. Whether fever is in itself a cause of muscular relaxation must be regarded as an open question.

It may therefore be said that while experimental evidence makes it highly probable that hindrance to the normal bile-flow from the gall-bladder facilitates infection of the human gall-bladder, our knowledge of the disturbances of cystic function that cause biliary stones is still incomplete.

Mode of Action of Bacteria.—There are two ways in which we may conceive gall-bladder infection to operate in the production of gall-stones, first by setting up cholecystitis, secondly by causing a decomposition of the bile. Although these processes are probably connected closely, we must consider them individually.

*It will be recalled that these investigators found bacteria much oftener in the bile of normal animals than have other writers.

Cholecystitis and Its Effects.—One of the consequences of a slight or moderate catarrhal cholecystitis is the proliferation, desquamation and degeneration of epithelial cells. These cells contain cholesterin, a part of which ultimately finds its way into the bile. Probably the quantity of cholesterin increases as time passes, owing to degenerative changes in the cells, the nature of which is obscure. It is well known that pus contains considerable cholesterin and that crystals of cholesterin are more apt to occur in old than in fresh pus. The cause of the increased production is not understood but is to be sought either in cleavages induced by bacteria or in ontolytic decompositions. The same may be said of the cholesterin of epithelial origin. The desquamated epithelium contains some calcium, but whether the calcium of gall-stones has this origin or is derived from mucus, is not clear. A careful study of the influence of cholecystitis on the calcium of the bile is a desideratum.

It is noteworthy that in their observations on purulent cholecystitis Ehret and Stolz were unable to find any indications of the presence of cholesterin in the contents of the gall-bladder.

Decomposition of the Bile.—In the course of any infection leading to cholecystitis the bile is liable to undergo decomposition. This is very plainly seen in typhoid fever, in the course of which a large part of the bilirubin is apt to be destroyed. The nature of the decomposition products is unknown and its study would surely lead to results of considerable interest. In purulent cholecystitis, also, the bilirubin disappears, often very rapidly, so that all traces of color may be lost in two or three days. Even in milder types of inflammation, such as commonly lead to cholelithiasis there is often a decomposition of the bile, the nature of the cleavage products being, however, but imperfectly understood. The presence of bilifuscin and bilicyrin in some gall-stones is probably to be regarded as an indication of decomposition of the biliary pigments. It is believed that the bile acids also undergo decomposition at times, with liberation of cholalic acid.

Whether these decompositions are the immediate result of the growth of bacteria in the bile or an indirect effect of altered secretory conditions of the inflamed mucosa is uncertain, but the former origin appears not improbable. Considerable alterations in the composition of the bile may be induced experimentally by modifying normal metabolic processes, but there is as yet no satisfactory evidence that cleavage products arise in this manner.

The decomposition of the bile, which is referable directly or more remotely to the activity of bacteria, may be presumed to alter profoundly the conditions upon which the presence of certain constituents (cholesterin, lime salts) of gall-stones largely depends and may thus have important bearings upon the problem of precipitation. A scientific discussion of this influence is at present not possible.

Influence of Reaction.—The opinion has already been expressed that variations in the reaction of the bile do not ordinarily play a leading rôle in determining the precipitation of the constituents of gall-stones but some further discussion of this point will not be amiss.

Very carefully conducted experiments made by Dr. E. K. Dunham* on the influence of the growth of the typhoid organism and the *Bacillus coli* on diluted sterile human bile indicated that even a considerable growth of these organisms after many days occasions only the slightest change in reaction, in the direction of acidity. It is possible that more pronounced acid production would be observed if the period of growth of these organisms had been retarded.†

It has been stated that the presence of free alkali in the bile is favorable to the separation of bilirubincalcium. We do not know, however, that an alkaline reaction is essential to this separation. An acid reaction would probably be inconsistent with the precipitation of bilirubincalcium.

Whether the production of alkali (ammonia acids) by the bacteria concerned in the establishment of cholecystitis is really a factor in the precipitation of bilirubincalcium is still uncertain.

From what has been said it appears conceivable that alterations in the reaction of the bile should exert some influence upon the precipitation of cholesterin and bilirubincalcium and that changes from an acid to an alkaline reaction or the reverse should have some significance for the stratification so often observed in gall-stones. Nevertheless the variations of cholelithiasis biles from the normal reactions are probably only very slight and the idea that the constituents of gall-stones are precipitated in consequence of alterations in reaction cannot be said to rest on a firm basis.

Effect of Concentration.—Mere concentration of canine and human bile appears to have very little influence upon the separation of bilirubincalcium, so long as bacterial decomposition is excluded. Bilirubin may, however, separate if the concentration be considerable. Mr. Rettger's experiments indicate that dog's bile is not usually saturated with cholesterin and that some concentration of the bile is possible without occasioning precipitation. The fact that the bile salts are concentrated *pari passu* with the concentration in cholesterin may help to explain the absence of cholesterin separation even after considerable concentration of the bile. Apparently the chief effect of mere concentration of the bile is to increase the liability to separation of bilirubin, but the question has not been fully worked out.

Presence of Proteids.—Steinmann found that egg albumin is capable of throwing calcium carbonate out of solution of calcium salts, and Naunyn showed that this mixture of proteids throws bilirubincalcium out of solution under certain conditions. Naunyn expresses the opinion that proteid substances may play a considerable rôle in determining bilirubincalcium separation from the human bile and thus have much to do with the formation of concretions. During cholecystitis various proteids make their escape from the epithelial cells of the gall-bladder into the bile, but we are still in ignorance as to the part they actually play in the production of calculi.*

Presence of Foreign Bodies.—Reference has already been made to the comparatively small influence of foreign bodies in causing cholelithiasis. It sometimes happens that the human gall-bladder contains a piece of silk ligature or a bit of metallic nature which has become incrusted with calcium salts. That the action of micro-organisms is not essential to such incrustation is evident from the experiment of Myake, in which a

Note by Dr. Dunham.—Experiments to determine changes in reaction of nutrient media containing bile were made as follows: Human bile was mixed with five times its volume of distilled water containing 1 per cent. of Witte's pepton and one-half per cent. of table salt, and the mixture filtered. In one experiment, this filtrate was placed in fermentation tubes and sterilized, by the intermittent method, in an Arnold Sterilizer. In another experiment the sterilization was accomplished by filtration through a Berkefeld filter. The fermentation tubes were inoculated with the colon bacillus or typhoid bacillus and kept in the incubator at 37° for from seven to ten days; blank tubes being kept under the same conditions as controls. After these intervals cultures were made from the fermentation tubes and then their contents titrated with a tenth-normal hydrate solution. In all cases the control tubes were sterile, and the other tubes were shown to contain pure cultures of the bacteria with which they had been inoculated. The appearance of the media in the fermentation tubes and in shake-gelatine cultures from them showed that a moderately abundant growth had taken place in the inoculated fermentation tubes.

Five cubic centimeters of the media in the fermentation tubes were diluted with distilled water to 200 c.c., and this diluted solution, which had a light green color, was titrated, phenolphthalein being used as an indicator. The amount of decinormal sodium hydrate solution required to effect a distinct, though faint, change of color in the diluted medium was noted, and then the standard alkaline solution added until a drop no longer caused a change of color at the point of introduction. There were no marked differences discovered between the reactions of the media in the control tubes and those in which a growth of the colon bacillus or the typhoid bacillus had extended over a period of seven to ten days. The differences noted were not greater than 0.1 c.c. of the decinormal alkali. Such a difference might be due to variations in the amount of evaporation in the different fermentation tubes or to errors in titration owing to the green color of the solution. It appears certain that no alkali is produced, and that, if there is any increase in the acidity of the media, it is very slight.

†*Note.*—Cholesterin is less soluble in an acid than in a neutral or alkaline bile and it is conceivable that even slight changes in the reaction of the bile may influence the separation of cholesterin crystals from a supersaturated solution. When cholesterin has once begun to be deposited about the nucleus of a future gall-stone it is not difficult to understand why the process continues, until cholesterin is no longer produced in such excess, through the desquamation of cells, that it suffices to keep the bile supersaturated. The real problem is to explain the first crystalline deposit of cholesterin.

It is well known that small masses of altered epithelium and bacteria are commonly found in the centers of cholesterin stones and it occurs to one that this fact may perhaps be related to the production of acid by the bacteria which often cluster so abundantly about epithelial remains. The multiplication of these organisms with the production of acid might perhaps determine the precipitation of cholesterin at the limited surfaces where the acid is liberated and where owing to the slowness of diffusion the ions might be presumed to exist in greater concentration than elsewhere in the bile. The process of crystalline deposition once begun the maintenance of an acid reaction at the point of deposit would hardly remain a necessity for further accretion to the young calculus, since according to a well recognized physical law crystalline deposits readily occur where similar crystals already exist.

In the alkaline fermentation of the urine we have a condition which furnishes us with a legitimate analogy. Here, as is well known, we often find deposits of crystalline phosphates in the mucus. But it is in the mucus that the alkali-forming bacteria are growing most energetically, and it cannot be doubted that the early deposition of crystals in the mucus (before their appearance elsewhere and before the entire volume of the urine is distinctly alkaline) depends on the focal liberation of diffusible alkali.

Whether cholesterin is ever precipitated in crystalline form when the bile reacts alkaline to phenolphthalein is at present unknown.

*Normal canine bile is capable of dissolving considerable quantities of Merck's mucin prepared from bile. May not an increase in the mucin of the human bile have some influence on the separation of bilirubincalcium?

silk thread was incrusted with lime salts, although the bile was sterile. Neither bilirubin nor cholesterin could be detected in the incrustation. At the present time there is no evidence that either cholesterin or bilirubincalcium ever separates merely because of the presence of a sterile foreign body in the gall-bladder. On the other hand there is much reason to believe that certain foreign bodies, such as masses of bacteria, and masses of epithelial cells, may act as the nidus for a gall-stone in the presence of a bacterial cholecystitis.

Influence of Agglutination.—Harvey Cushing* has called attention to the fact that in typhoid fever there may be an active agglutinative serum reaction toward both *Bacillus typhosus* and the colon bacillus isolated from the gall-bladder. The bile may share the agglutinative properties of the serum. Richardson† has examined at autopsy the bile of fatal cases of typhoid fever and found large clumps of bacilli in five out of six cases. It is possible that bacilli agglutinated in large clumps by agglutinations present in the bile are more likely to form the nidus for stone formation than individual unclumped bacilli or smaller clumps of bacilli, but definite information on this point is lacking. It is also uncertain whether a large clump of living bacteria offer a better starting point for the production of a gall-stone than an epithelial fragment or cell of equal size. The possibility already mentioned, that living bacteria may influence by their products the reaction of the bile, especially at the seat of their production, and thus facilitate the separation of cholesterin or of bilirubincalcium is perhaps worthy of receiving serious consideration in connection with the phenomena of agglutination.‡

Time Required for Gall-stone Formation.—Until within very recent years there was no information as to the time required for the production of a human gall-stone. This arose from three circumstances. First, gall-stones may lie for an indefinite period in the gall-bladder without causing symptoms. Hence ordinary clinical observation could not furnish the needed light. Secondly, the size, number, consistence and chemical characters of gall-stones afford no certain data as to their age. Lastly, no one had succeeded in experimentally inducing true gall-stone production. The work of Gilbert and Mignot, already described, has shown that under suitable conditions true gall-stones may be experimentally induced in the course of three to six months. We cannot without further information assume that the same period suffices for the production of human stones, but these experimental results are strongly suggestive of the possibility of rapid calculus production in man. An observation made by Hansemann makes it probable that a human gall-stone may attain a moderate size in the course of seven months.* The case in question is not quite conclusive, because although the stone was an ordinary mixed cholesterin and bilirubincalcium calculus, it probably had an extracystic origin in the duodenum of a patient who had undergone a gastro-enterostomy. The absence of an acid gastric juice was apparently an important element in permitting the production of the stone. Homans† has reported an instance in which stone-formation recurred in not more than one year and eight months and Kelve‡ records a case in which the period of reformation was probably less than a year and a half.

Although positive evidence is still wanting we are justified in regarding it as probable that gall-stones may form in the human gall-bladder in the course of three or four months, when the conditions are especially favorable. Hence, when an early operation for cholelithiasis is undertaken the possibility of an early recurrence cannot be left out of mind, as the gall-bladder is liable to be left in an infected state.

Paths by which the Bacteria Enter the Gall-bladder.—There are three paths by which microorganisms may gain access to the liver and through the liver to the contents of the gall-bladder: (1) From bacterial foci which discharge into the general circulation; (2) by the passage of bacteria into the common bile duct from the duodenum; (3) by the passage of bacteria from the intestine into the portal circulation. The first path is probably frequently followed by the bacteria that set up the cholecystitis which is responsible for making calculi. The second path at first sight seems the most important and natural one for cystic infection. Yet we do not know under precisely what conditions infection follows this route. In health the duodenum contains few bacteria and these are not of the varieties responsible for the cholecystitis that lead to cholelithiasis. In gastroduodenitis and duodenitis streptococci are sometimes abundant in the duodenum and may perhaps find their way to the gall-bladder. Possibly also in the course of other digestive disturbances colon bacilli find their way along the biliary ducts to the gall-bladder.

There is some reason to believe that the most frequent route for infective agents is the portal circulation. This view has been especially emphasized by Dr. Lartigau,§ of New York, who induced inflammation of the intestine of dogs by means of corrosive sublimate and other irritants. The animals thus prepared were fed (patho-

*Typhoidal Cholecystitis and Cholelithiasis. Report of a Case without Previous History of Typhoid Fever, and Discussion of a Possible Agglutinative Reaction in the Bile and its Relation to Stone Formation. Bulletin of the Johns Hopkins Hospital, Vol. IX, No. 86, May, 1898.

†On the Role of Bacteria in the Formation of Gall-stones. The Journal of the Boston Society of the Medical Sciences, Vol. III, p. 79, Jan., 1899.

‡The agglutinative properties of the bile have been recently investigated by Arnold Cantani, Jr. He finds that the bile of animals immunized against typhoid, colon or influenza bacilli possess a considerable agglutinative activity for these organisms. This activity is, however, distinctly less marked than that possessed by the blood serum. (Ueber die agglutinirenden Eigenschaften der Galle. Centralblatt für Bakteriologie, etc., Erste Abtheilung, Bd., XXXIII, No. 9, p. 731, 1903.)

*Ein Beitrag zur Entstehung der Gallensteine, Virchow's Archiv, Bd. 154, Heft 2, p. 380, 1898.

†Annals of Surgery, p. 115, 1897.

‡Die chirurgische Behandlung der Gallensteinkrankheiten, Berlin, 1886.

§New York Academy of Medicine, Dec., 1902.

genic) bacteria which were soon found in the bile. In some instances the cystic duct, in others the common duct, was ligated previous to the feeding with bacteria. Hence infection must have occurred through the intestinal mucous membrane, doubtless at the point of injury.

Dissenting voices have been raised against the doctrine that biliary infection occurs through the portal vein. Thus in a recent paper Carmichael* states that he injected, in separate experiments, typhoid bacilli, *Bacillus coli communis* and *Streptococci* into the portal circulation of rabbits without being able to recover bacteria from the bile. He considers that these experiments not only support the view that the liver destroys the micro-organisms that reach it but render improbable the occurrence of biliary infection by way of the intestine and portal circulation. If, however, we take into consideration the positive results obtained by Blachstein,† Fütterer‡ and others there can remain no doubt that the intravenous injection of *Bacillus typhosus* and *Bacillus coli communis* is very often followed by the appearance of the injected organisms in the bile. It is true that in these experiments the bacteria were put into the systemic circulation and may have reached the gall-bladder through the cystic artery, without having first traversed the liver, but this appears unlikely. Dr. Welch§ states his belief that Blachstein's inoculations were very often followed by negative results as regards infection of the bile. These negative results are probably referable mainly to the bactericidal powers of the liver cells. The negative results obtained by Carmichael cannot therefore be taken as proof that biliary infection does not arise by way of the portal circulation. A consideration of the evidence at present available makes it extremelv probable that the bile may be infected by way of the portal system, despite the bactericidal action of the liver cells. This is true not only of experimental infections in animals, but also of human biliary infection with the organisms of typhoid fever, and the *Bacillus coli communis*. How often infection of the bile arises in consequence of ulcerative lesions in the intestinal tract is not yet clear, but it is certain that such lesions must greatly influence the liability to biliary infection. As yet, however, it is impossible to say with certainty whether the portal system or the direct duodenal path is the more frequent route of biliary infection in man.

Do Gall-stones Originate Independently of Infection of the Bile Passages?—The facts that have been reviewed clearly show that through the local action of bacteria upon the walls of the gall-bladder (or bile passages) there may be created all the conditions essential for the production of gall-stones. The experimental formation of real calculi makes it safe to conclude that derangements in general metabolism are not essential factors in the process of production. This is, however, no evidence that disturbances of metabolism which modify the composition of the bile, may not under certain conditions play an important part in bringing on cholelithiasis. There are many French and English writers who hold that constitutional states attended with metabolic disorders are a common cause of gall-stone formation. It is worth while to examine the foundation on which this view rests.

Constitutional Influences Modifying the Composition of the Bile.—It is surprising to find how little satisfactory information exists as to the influence of different kinds of dietaries on the composition of the bile. Paton and Balfour* found through observations on a woman with a biliary fistula that the amount of solids in the bile rose with the amount of nitrogen excreted by the urine. Brockbank† looks on these observations as evidence that more bile salts are produced from a nitrogenous diet than from one poor in nitrogen. Admitting this inference to be sound one would be led to the conclusion that persons on a diet rich in nitrogen make bile capable of holding in solution more cholesterin than persons who live on meager nitrogenous rations. Whether there is actually a greater liability to gall-stones among those who consume little nitrogen is not conclusively shown by any statistics bearing on this point. I cannot believe that variations in the percentage of bile salts are of great importance in determining the incidence of cholelithiasis, for the reason that the great factor in the formation of cholesterin containing stones is the local condition of the gall-bladder. In other words a cholecystitis leads to the local presence of so much cholesterin that the quantity of bile salts in the bile cannot greatly influence the ultimate deposition of cholesterin.‡ There is no reason to think that the percentage of bile-salts in the bile exerts an influence on other biliary constituents than cholesterin.

Whether an increase in the cholesterin of the blood, from constitutional causes, ever markedly modifies the amount of cholesterin in the bile is a question that cannot now be answered. Fischer reports a case of diabetes with lipemia and cholesteremia in which the blood held at least 0.478 per cent. of cholesterin, a quantity greatly above the normal average.§ The observation is of interest as indicating the possibility of a marked cholesteremia in a constitutional disease, but there is no certainty that even so great an excess of cholesterin in the blood leads to a significant excess in the cystic bile.

Further studies of the relationship between the

*The effect of injection of micro-organisms into the portal system, on the sterility of the bile in the gall-bladder. The Journal of Pathology and Bacteriology, Vol. VIII, No. 3, Sept., 1902, p. 276.

†Intravenous inoculation of rabbits with the *Bacillus coli communis* and the *Bacillus typhi abdominalis*. Johns Hopkins Hospital Bulletin, Vol. II, p. 121, 1891.

‡Wie bald gelangen Bacterien, welche in die Portalvene eingedrungen sind, in den grossen Kreislauf, and wann beginnt die Ausscheidung durch die Leber und die Nieren? Berl. klin. Woch., Bd. XXXVI, S. 58, Jan. 16, 1899.

§In a footnote to Blachstein's paper.

*Laboratory Reports, Royal Coll. Phys., Edinburgh, 1891.

†On Gall-stones and Cholelithiasis, 1896, pp. 27 and 83.

‡Ueber Lipämie und Cholesterämie, so wie über Veränderungen des Pankreas und der Leber bei Diabetes mellitus. Virchow's Archiv, Bd. 172, Heft 1, p. 47, 1903.

§Hoppe-Seyler found from 0.02 to 0.06 per cent. of cholesterin in the plasma and serum.

cholesterin of the blood and of the bile are much to be desired.*

Influence of Excessive Feeding of Fat.—Gall-stones sometimes contain a considerable percentage of fat, which may be present chiefly as a compound of stearic acid.† As the origin of this acid is obscure it was determined to make some observations with a view to learning whether the ingestion of large quantities of fat has any influence on the fat content of the bile, as has been stated by Naunyn. These observations had an unexpected outcome.

Two dogs were fed on boiled beef fat and an extremely small amount of boiled meat. During twelve weeks one dog (weighing about 32 pounds) was induced to eat from one-half to one pound of fat daily. During the last two weeks of the experiment he received potatoes mixed with fat. At autopsy the subcutaneous and omental fat was found to be extremely abundant. The liver was very markedly fatty. The bile was normal in quantity, color, consistence and reaction (faintly alkaline to litmus) but contained an abundant sediment of dark brown particles about the size of large grains of sand. These little masses were found to consist of pigmented, highly refractive hyaline material mixed with the débris of degenerating epithelial cells, portions of which were stained readily by osmic acid. No cholesterin could be detected in these particles; certainly none was present in crystalline form.‡

A second dog (about 19 pounds) was fed for nine weeks in the manner just described. For 3 weeks he consumed nearly one-half pound of fat per day. Then for a week he refused to eat. During the last two weeks of the experiment the fat was mixed with potato and was voraciously eaten. The gall-bladder contained a little bile of normal consistence, color and reaction (slightly alkaline). Affixed to the base of the gall-bladder was a small, black spherical concretion (about 4 mm. in diameter), of somewhat firm consistence. Near it lay numerous small detached irregularly shaped black masses of apparently the same material. Microscopical examination showed the concretion and the separate masses to consist of deeply pigmented, highly refractive hyaline material. No crystals of cholesterin were detected. The mucosa near the adherent body was considerably thickened and presented numerous small translucent miliary projections.§ The mucosa for a short distance about the adherent body was covered by a gelatinous layer of great transparency from 1 to 2 mm. in thickness, apparently consisting of mucinous material.*

Sections made through the gall-bladder and the attached intracystic body showed the "concretion" to be made of a group of glands greatly dilated by what is probably an accumulation of partially transformed mucus, grown firm from inspissation. A fuller description of this body will be given when the results of other fat feeding experiments are described.

These observations are of some interest on account of their suggestiveness. I have examined the gall-bladders of a large number of meat-fed dogs without having ever observed a sediment like that found in our first dog or an attached body like that discovered in our second. Whatever may be the origin of these pathological conditions it is improbable that they are dependent on infection of the gall-bladder. Positive evidence on this point is unfortunately wanting, as I carelessly omitted to make cultures from the bile. Nevertheless it seems most likely that the changes observed are of diathetic rather than local origin.

Two leading questions are raised by these experiments: First, do the glandular alterations noted in the gall-bladder depend on the pathological conditions of fat metabolism, and secondly, do similar glandular accumulations occur in the human subject and sometimes form the beginnings of true gall-stones? An answer to these questions may reasonably be expected from additional experimental observations and from histological studies of the human gall-bladder.†

Influence of Gout, Arteriosclerosis and Diabetes.—Some writers have assumed the existence of a close connection between gout and gall-stones and various hypothetical‡ reasons have been advanced to explain the alleged connection. I have been unable to find any substantial evidence in favor of this relationship between cholelithiasis and gout. In the 179 Presbyterian Hospital cases which Dr. Williams has analyzed for me there is no instance in which a history of gout was noted, although some form of rheumatism existed in 20 of these patients. This showing is thus extremely different from foreign statistics like those of Lenac, where gout was present in 95 out of 166 cases of cholelithiasis. That gout and gall-stones should be often associated in countries where both diseases are common is not surprising and the fact does not in itself imply any etiological relationship.

*As red blood cells contain considerable cholesterni, pathological processes attended with excessive hemolysis might be expected to raise the cholesterin of the blood, but I am not aware of any observations bearing on this point.

†It is said that gall-stones occasionally contain as much as 16 or 17 per cent. of stearic acid. In a series of variegated gall-stones examined for me by Mr. Rettger stearic acid was positively detected in no instance, although in one case it may have been present in very small amount.

‡Analysis of the bile from this dog gave the following results:

Cholesterin	.360 per cent.
Calcium oxide	.09 per cent.
Ethereal extract, not including soaps, but consisting of neutral fat, cholesterin and lethicin	.97 per cent.
Solids of bile	20.29 per cent.

Although the cholesterin residue was somewhat oily and contributed to give a high weight it seems clear that the cholesterin in the bile was increased considerably above the normal.

§The miliary projections were seen on histological examination to consist of groups of simple glands whose lumina were considerably distended with mucus.

*Analysis of the bile from this dog gave the following results:

Ethereal residue after saponifying (including neutral fat, fatty acids, soaps and cholesterin)	3.39 per cent.
Cholesterin found	.213 per cent.
Calcium oxide	.120 per cent.
Solids of bile	22.09 per cent.

Cholesterin figure is somewhat high on account of admixture of oily substance.

†I believe there is much to be learned about the pathology of the bile in its relation to cholelithiasis from systematic chemical and histological studies of the sediments so often found in human gall-bladders (even where autopsies are made early) and from histological studies of the mucosa of the dependent parts.

‡See Brockbank, loc. cit., p. 85.

As both arteriosclerosis and gall-stone disease increase in frequency with advancing years we cannot wonder that they should be often observed together in the second half of life. The statistical reports to which I have had access do not certainly establish a special etiological relationship. It is noteworthy that among Dr. Thacher's Presbyterian Hospital cases some form of arteriosclerosis (coronary disease or alterations of the aorta) existed in 80.4 per cent. But in order to give these figures any special significance it would be necessary to show that calculi are distinctly more common in arteriosclerotic persons than in persons of comparable ages dying from all other forms of disease. A study of Dr. Thacher's records from this point of view has been commenced by Dr. Williams but is at present not completed.

It has been often claimed that there is a close connection between diabetes and biliary calculi but a critical examination of the evidence does not sustain this contention. On the contrary it appears to me that gall-stones and diabetes are but rarely associated. Dr. Williams says that Kundrat observed cholelithiasis only once in 92 autopsies on diabetic patients. Of Dr. Thacher's 179 cases two died of diabetes.

The fact that gall-stones and diabetes are not more frequently associated has one important bearing on the theory of gall-stone formation. Bouchard, who has been a strong advocate of the constitutional hypothesis of cholelithiasis attributed the alleged relationship between the two diseases to the well known acid production of diabetes. He also believed that pathological acid production in other conditions than diabetes is a factor in causing gall-stone formation. If an acid intoxication ever exerts an influence on gall-stone formation, it should certainly make itself felt in diabetes, where very large quantities of pathological acids are often produced. Yet there is not reliable statistical evidence of this supposed effect; and it must be said that one would hardly expect the acid intoxication of diabetes to influence the reaction of the bile, as the pathological acid in the blood is so promptly neutralized by ammonia and other bases. There is thus no reason for supposing that free acid ever reaches the bile from the blood. This fact has not been sufficiently considered by those who favor the doctrine that acid intoxications have an influence on gall-stone production.

It is plain from what has been said that there is at present no unequivocal evidence that gall-stones arise from constitutional derangements unconnected with micro-organic invasions of the gall-bladder. On the other hand it is certain that the cholesterin of the bile can be considerably increased by local irritants unconnected with infection and it is likely that the requisite local conditions for such increase sometimes arise through purely metabolic disorders. While gall-stones are commonly the result of local infections we should carefully guard against the conclusion that they can never have a diathetic origin. It is at least highly probable that diathetic conditions are capable of so altering the composition of the bile as to materially favor the production of calculi in the presence of suitable local bacterial activities.

Medical Treatment of Gall-stones.—Few facts have as yet emerged from the nebulous region of gall-stone therapeutics. We have learned that the surgeon is far more successful than the physician in the treatment of established cholelithiasis. We have learned also that certainly most of the drugs to which cholagogue virtues were once attributed are really undeserving of confidence. The bile salts and possibly the salicylates possess cholagogue properties, but whether these can be turned to account to bring about the solution of a gall-stone must be considered very doubtful. It is certain that through the free use of fat in the dietary the percentage of fat in the bile may be increased above the average but we do not know whether the increase is ever so great as to cause a marked solvent action on the cholesterin of the gall-stones. Such an action appears to me improbable. Other constituents than cholesterin are insoluble in fat. The experimental results which we have obtained from prolonged feeding of fat raise the question whether it is really wise to give patients a rich oleaginous diet, especially in those substances where there is obesity and an inactive habit of life. Restriction both in fats and carbohydrates seems the more rational course and with this there should be free muscular exertion when this is practicable.

It seems probable that in future physicians who treat patients with gall-stones will direct their attention largely to measures designed to favor the subsidence of cholecystitis. How much it is possible to influence such a condition we cannot positively say. Hygienic influences that raise the general bactericidal powers of the cells presumably have a beneficial effect upon cholecystitis of infective origin. The value of antiseptics is a matter which future studies will have to decide but it is not unreasonable to hope that some bactericidal effects will be shown to result from the use of certain antiseptics, which like benzoic acid may enter the bile.

Statistical Note.—Dr. John S. Thacher, of the Presbyterian Hospital, was so kind as to place at my disposal the records of autopsies made there, and Dr. Lindsay Williams undertook to analyze these records with reference to their bearing on the incidence and etiology of gall-stones. Some of the results of Dr. Williams' analysis are of sufficient interest to incorporate in this report on the etiology of biliary calculi.

Among 2,371 autopsies gall-stones were found in the gall-bladder 179 times (7.6 per cent.). Of these gall-stone subjects 99 were females, 80 were males. But as the percentage of males among the entire number of patients subjected to autopsy was 65.5, the incidence of cholelithiasis was really a little more than twice as great in females as in males. The distribution of the cases as regards age was as follows:

MALES.		FEMALES.	
10 years	1	20 to 30 years	7
10 to 20 years	0	30 to 40 years	19
20 to 30 years	3	40 to 50 years	19
30 to 40 years	3	50 to 60 years	20
40 to 50 years	15	Over 60 years	23
50 to 60 years	25	Unknown years	11
Over 60 years	29		99
Unknown years	4		
	80		

Of 50 women about whom the facts were ascertainable 70 per cent. had borne children. The adipose was described as "fair," "considerable" or "abundant" in 113, as "scant" or "poor" in 59.*

No satisfactory information in regard to the chemical character of the gall-stones was reached in the majority of instances. In 32 cases the stones were single. In several instances large numbers of calculi were present; once there were more than 100, once 267, once the number exceeded 1,000. Very frequently there were from 12 to 40 stones in the gall-bladder. Frequently also there were present from 2 to 12 stones.

As to family history there is nothing notable to record, except that a family history of tuberculosis was obtained in 12 instances. As to personal history the following points were noted: Typhoid fever was present in 5 cases, but this of course gives no indication as to the number of stones of typhoid origin. Tuberculosis could be detected clinically in 7 patients and was several times found at autopsy, when it had not been recognized during life. Syphilis existed in 6 cases. A history of gall-stones or colic or obstructive jaundice was present in only 9 cases. In 33 cases the use of alcohol was admitted. In 20 cases there was a history of rheumatism in some form. No case of gout was known to exist, nor could a history of lacing be obtained in any case.

In 11 cases no note was made of the condition of the liver. In 50 cases this organ was normal or nearly normal (gross appearances). In 56 cases the liver was congested or nutmeg. In some of these the liver was also fatty or cirrhotic; the liver was markedly fatty in 28 cases, cirrhotic in 20. All but six of the 28 cases of fatty liver occurred in women, a large proportion of whom were over forty years of age. The preponderance of women with both gall-stones and fatty liver over men is therefore about twice as great as the preponderance of women over men in the entire series of cases. New growths were present in the liver in 9 cases, abscess existed in 6 cases.

Of the 87 cases in which suitable data exist as to the condition of the arteries, arteriosclerosis was present in 70 (80.4 per cent. of these 87 cases). In these cases alterations were found either in the coronaries or in the aorta or in both situations.

The total number of deaths referable directly to gall-stones or their sequelæ was 11 (6.1 per cent.). This low percentage is probably not referable to any considerable extent to the results of operative interference, as many of the cases occurred before the days of highly accurate diagnosis and early operation.

Perhaps the most striking thing about this analysis by Dr. Williams (to whom I am much indebted) is the large proportion of cholelithiasis patients who showed arteriosclerotic changes. It is not yet apparent, however, that this frequent association possesses any special etiological significance, as it is not clear that similar lesions in persons without gall-stones are not equally frequent at autopsies on patients of the same age, sex and habits of life. As the point is one of some interest a statistical comparison is now being made with a view to determining whether the high proportion of arteriosclerotic lesions in gall-stone cases has any etiological meaning.

I wish to express my sense of obligation to Dr. A. J. Wakeman and Dr. Helen Baldwin for their essential contributions to this paper, and to Dr. J. S. Thacher and Dr. Lindsay Williams for facts relating to statistical questions. I desire also to thank Dr. J. Edgar Welch for his zeal in obtaining for me the autopsy material on which Dr. Baldwin's analytical work is based.

*In some instances the body was described as emaciated.

THE PATHOLOGY AND TREATMENT OF TARDY POSTOPERATIVE INTESTINAL OBSTRUCTION WITH A REPORT OF CASES.

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ACUTE obstruction following laparotomy is not a rare occurrence. It is most frequently the result of paralysis of peristaltic activity from a spreading or septic peritonitis; it occurs less frequently after laparotomy for a non-purulent condition, even though no infectious material has been introduced at the time of operation. In this latter group of cases, the obstruction is usually of a mechanical nature and is due to the angular adhesion of one or more loops of intestine to the parietal peritoneum, to each other or to the stump of some recently ligated pedicle of omentum or ligated base of tumor to a possible volvulus or to the protrusion of a coil of intestine through some accidental orifice in the mesentery or other peritoneal structure.

In all of these conditions, the symptoms indicating obstruction develop shortly after the operation and usually before satisfactory restoration of the intestinal function has taken place. On the other hand, "tardy" intestinal obstruction, following operation, refers to those cases in which an interval of weeks, months or even years elapses before the symptoms of obstruction appear—an interval, in which the patient enjoys excellent health and in which there is no irregularity in the movement of the bowel. In this group of cases the cause of the obstruction is always of a mechanical nature, the lumen of the intestine being narrowed by the contraction of a circumferential cicatrix within its wall or by the constriction of a

band without, beneath which the intestine has accidentally passed and subsequent extrication has proved impossible. In other cases, the stricture is due to the progressive kinking of a segment of intestine from the contraction of adhesions of organized connective tissue, joining together at an angle those loops of which the segment is composed. In many cases several of these conditions coexist.

Apart from the particular form of constriction, there is little variety in the lesion. The gross changes comprise one or more bands of connective tissue, in the formation of which the great omentum is a very frequent and important factor. These bands are attached to some fixed point on the parietal peritoneum or to some fixed or movable viscus. In this way it forms the portion of the boundary of a small aperture beneath which a loop of intestine becomes imprisoned and subjected to such constriction, that, in the absence of relief, necrosis is inevitable.

The adhesions between adjacent loops of intestine are formed of similar tissue of so firm a character, that the mass of intestine can be disentangled only with considerable difficulty and only by the generous use of forceps and scissors.

Stricture due to the constriction of a circumferential scar in the wall of the intestine is of the simple non-malignant variety and presents the usual features of that condition. To the outer surface of the stricture, the omentum and one or more loops of intestine are usually adherent.

Other pathological changes may be associated with those directly responsible for the obstruction; thus, adhesions and bands in more or less remote parts of the abdominal cavity are not infrequent and, in addition, the lesions, such as those of a chronic tuberculous peritonitis for the relief of which the original laparotomy was performed, may coexist.

Without interference, the constriction leads to necrosis or perforation of the wall of the affected gut with subsequent spreading peritonitis, a condition so well recognized as to require no further description.

The symptoms indicating obstruction develop either slowly or gradually: in the former group of cases, occasional attacks of constipation which are not sufficiently marked to attract the attention of the patient, with or without colicky pain, occur irregularly during a period of several months prior to the final attack of obstruction; in the latter group, symptoms indicating serious obstruction appear without warning or premonition of any kind: in both, the obstruction proper runs a rapid course. The treatment is prophylactic, in that by observing certain precautions and by careful attention to detail and technic both during and directly after the primary operation, the danger of the formation of permanent adhesions is very largely minimized. The treatment of the attack of the obstruction proper does not differ materially from the treatment of acute obstruction from any cause.

Prophylactic measures at the time of the original laparotomy include the careful exclusion of any kind of mechanical, thermal or chemical irritation from the contents of the abdomen. Thus, the utmost gentleness should be observed in the necessary manipulation of intestine and every precaution taken to avert the accidental catching of a loop with the edge of a retractor. The use of too hot saline fluid or of germicidal solutions containing some chemically irritant or caustic ingredient such as the bichloride of mercury, for purpose of irrigation, damages the visceral peritoneum and should be carefully avoided.

All ligatures, by acting as foreign bodes, are sources of mechanical irritation and should therefore not be needlessly applied; thus, many adhesions, the result of previous localized peritonitis may be divided without fear of hemorrhage; on the other hand, the pedicles of tumors or bands connecting these with the adjacent parietal peritoneum frequently contain large blood-vessels, requiring ligature, the irritant effect of which, however, can be diminished by the use of catgut rather than of silk. Another frequent cause in the production of chronic peritoneal adhesions is the presence of denuded stumps such as those of an amputated appendix or of the uterus and broad ligaments after a supravaginal hysterectomy. To obviate as far as possible band formation from this cause, the surgeon endeavors, prior to the closure of the abdomen, to cover all stumps with a smooth peritoneal investment. In the amputated appendix, this is accomplished by a purse-string suture around its base; in hysterectomy, by covering the uterine stump with a flap of peritoneum and by drawing together with Lembert sutures the parietal peritoneum on either side of the ligated broad ligament. In addition to these precautions, lines of suture may be covered, when feasible, with omentum, the adhesions which develop between such suture lines and omentum being preferable to angular adhesions of loops of intestine to each other.

Unfortunately, however, in certain laparotomies, the separation of extensive adhesions, involving the parietal peritoneum, the mesentery, and the hollow viscera exposes denuded areas so large that their investment with peritoneum proves impossible. In these cases an effort may be made to diminish the almost certain probability of band formation by covering the exposed area with a segment of very thin rubber tissue or of Cargyle membrane. Sufficient time has not yet elapsed to permit of an accurate estimate of the efficacy of this procedure in the human subject. The writer has observed in several instances, parietal displacement of pieces of Cargyle membrane from the wall of intestine due to the friction associated with the return of the affected loop into the abdominal cavity. Such displacement may be prevented in the case of rubber tissue by the passage of several sutures between it and the edge of the denuded area.

The management of drainage is an all important factor. The use of a drain in almost all laparotomies for abscess formation is indispensable; its

presence, nevertheless, is disadvantageous in that it favors band formation. Occasional exceptions are, however, noted from time to time in those cases in which, a second laparotomy being necessary, the adhesions observed at the time of the primary operation have either become insignificant or have entirely disappeared.

Notwithstanding occasional immunity from this danger, therefore, band formation, after the use of drains to such an extent as to prove a future source of trouble, is a distinct probability. The risk so incurred may be minimized by using as small an amount of drainage material as is consistent with the patient's safety and in the event of a capillary gauze drain, by enveloping the same in a cylinder or sheath of sterilized rubber tissue.

Furthermore, the early change of the drain with subsequent diminution of its bulk when it must be replaced, and, in certain cases, its early complete removal render the formation of permanent adhesions less likely.

The immediate postoperative treatment consists in establishing at the earliest possible moment, normal or preferably exaggerated peristaltic activity. During the first twenty-four hours, when the stomach is in an unsettled condition, the restoration of that function is favored by the use of rectal enemas of warm saline solution with or without turpentine and, in cases of persistent vomiting, by lavage. As soon as the nausea and vomiting subside, small doses of calomel and salts should be administered and movements favored by high turpentine injections. These measures avert to a certain extent not only the adhesion of intestinal loops but by the removal of all fermenting material, the development of adhesions from possible chemical irritation of toxic substances as they are absorbed by the intestinal wall, is very largely prevented.

The formation of adhesions is still further probably decreased by frequent changes in the position of the patient. This can preferably be accomplished by alternately raising and lowering the head or foot or sides of the bed. In this way, without discomfort to the patient the mobile contents of the abdomen may be directed to different parts of the cavity through the action of gravity.

These various measures are not cited as a part of the routine treatment of every laparotomy, but only when, after an extensive or infectious peritonitis, or after operations involving suture of the intestinal loops or after operation for the relief of obstruction due to bands subsequent band formation is to be apprehended.

The actual treatment of the obstruction proper does not differ essentially from the treatment of obstruction from any cause. Early laparotomy, the ligation and removal of constricting bands, the disentanglement of adherent intestine with resection (in those cases in which the loops are so firmly bound together that their separation is impossible, or in those cases in which the affected intestine has become necrotic), subsequent closure of the abdomen with or without drainage, together with the adoption of those measures already described, for the prevention, if possible, of subsequent adhesions, comprise the general routine treatment in these cases.

Case I.—Laparotomy for gangrenous appendicitis, complicated with general septic peritonitis; recovery. Acute obstruction seven weeks later; operation on the fifth day, death.

G. L., aged twenty years. With the exception of two attacks of catarrhal appendicitis during the past three years, patient has always enjoyed excellent health. About ten days before the patient was seen by the writer, the present attack began, the invasion being marked by severe pain, at first in the vicinity of the umbilicus, afterward referred to the right iliac fossa. During the first forty-eight hours there was vomiting and constipation, the latter yielding to catharsis. The pulse was at no time over 90 nor the temperature over 100°F. An examination by the attending physician showed general rigidity of the abdomen, most pronounced in the right lower quadrant, and tenderness on pressure. These symptoms continued for about one week, when the vomiting which had previously subsided, recurred and became fecal, the constipation absolute with the pulse increasing gradually to 120 and the temperature to 102° F. At the end of that time, an examination by the writer revealed a firm board-like abdomen without marked distention. There was slight dulness in the lower right quadrant. There was almost complete absence of peristaltic activity. Pulse varied between 130 and 140. General condition was apathetic. Operation under ether.

The appendix was exposed through the usual intermuscular incision. It was deeply situated, overhanging into the cavity of the true pelvis. It was gangrenous and surrounded by a small quantity of very foul smelling pus. There was a perforation near the tip. The cecum and adjacent coils of small intestine were distended, of a dark red color and injected and in places were covered with masses of fibrine. The pelvis and the lower half of the abdominal cavity were irrigated through a secondary incision in the median line below the umbilicus with a warm saline solution. Rubber tube drains, surrounded with iodoform gauze were introduced through both incisions converging into the bottom of the pelvis. Bandage.

For twenty-four hours after the operation, patient's condition was very critical, the pulse ranging as high as 150, and of poor quality. The fecal vomiting ceased immediately, however, and twenty-four hours after, the bowels moved to an enema. The temperature, never higher than 103° F., became normal about the tenth day, the pulse became normal during the third week. Both incisions closed by granulation, and were completely healed at the end of the fifth week.

I am greatly indebted to Dr. James E. Moore for the following notes of the subsequent obstruction:

About seven weeks after the primary operation

complete constipation developed with symptoms of obstruction. A large dose of calomel and castor oil was immediately vomited. At the end of four days, Dr. Moore was called in consultation by the attending physician and advised immediate operation. The abdomen then had become moderately tense and distended. The peritoneal cavity was opened by an incision along the outer border of the right rectus, disclosing extensive adhesions in every direction, especially in the right lower quadrant. The bowel was greatly distended and rather dark-colored above a band in the upper right quadrant, being collapsed below the point of constriction. With the division of the band, the collapsed portion became gradually distended but only for a short distance when another band was encountered which produced very deep constriction. At least five strong bands and several smaller ones were divided and then the intestine was returned into the abdominal cavity and the wound sutured. The patient's general condition was as good after the operation as before. On the third day the bowels moved after a dose of castor oil and rhubarb, but on the following day patient gradually grew weaker and died.

Case II.—P. M., male, aged nine years. On October 24, 1901, about two o'clock in the afternoon, patient was knocked down by a cable car, but did not become unconscious. He complained of pain in the right wrist and hand, the head and the left side of the abdomen. There was pallor and profuse perspiration, and the patient was brought to the hospital in considerable shock. One hour after admission patient vomited green fluid, several attacks occurring in the course of the next two hours. During this time there were several attacks of colicky pain in the abdomen and the condition of shock continued. On examination, the upper two-thirds of the left side of the abdomen was tender and rigid. There was a point of maximum tenderness three inches to the left of the umbilicus. No mass could be detected. The patient lay on the left side and could not move toward the right without great pain. There was some dulness in the right flank. The left thigh was flexed. The pulse was slightly over 130. The rectal temperature about 100° F. Six hours after the accident, the abdominal tenderness had become more marked, and the rigidity had extended over a great segment of the abdominal wall. There was no appreciable improvement of the shock.

Operation eight hours after the accident, under gas and ether. The peritoneal cavity was opened by a 5-inch incision along the outer border of the left rectus above the level of the umbilicus. It contained turbid serum mixed with intestinal contents. A rupture was found in a coil of small intestine, involving one-third of its circumference. It was closed with a Czerny-Lembert suture. The adjacent coils of small intestine were injected and carefully cleansed with hot salt solution, as was also the pelvis which contained a considerable amount of partially digested intestinal matter. Drainage of the pelvis, with partial closure of the abdominal wound.

On the first day after the operation, the pulse was as high as 144, the temperature 102° F. On the third day, the pulse had decreased to 100, and the temperature to 99.5° F. Both became normal on the sixth day. For forty-eight hours after the operation, there was a moderate amount of vomiting. Bowels moved after enema on the second day. The abdominal incision had completely closed by the twenty-sixth day.

On January 16, 1901, the ventral hernia resulting from the primary operation was closed. In the course of the operation, the omentum and loops of intestine were found to be adherent to the edge of the hernial orifice and were separated before the sutures were inserted. The patient made an uneventful recovery.

On May 13, 1901, patient entirely well since last note until four days ago. At that time, after a hearty lunch, severe cramp-like abdominal pain developed, with vomiting and complete constipation. The vomiting at the time of admission to the hospital had become fecal. On examination, there was moderate distention, especially in the upper part of the abdomen. There was slight general rigidity. The vomitus was brown and of a fecal odor. The patient was in a condition of collapse, pulse 120, temperature 100° F.

Operation; gas and ether. The peritoneal cavity was opened by a median incision below the umbilicus. The small intestine was deeply constricted by an omental band near the posterior wall. Above this point, it was greatly distended, and below it was markedly collapsed. The division of the band was not followed by a return of the constricted portion to its original dimensions. It remained deeply indented and its wall seemed thickened from the deposit of connective tissue. No intestinal contents could be forced through. The loops of small intestine directly above and below the stricture were joined by a lateral anastomosis; closure of the abdominal wound. After the operation the temperature rose steadily to 105° F., the pulse to 190, and death took place seven hours afterward.

Case III.—K. L., aged forty-six years. This patient was operated on in the Presbyterian Hospital for a fibrocystic tumor of the uterus, October 10, 1899, by Dr. C. K. Briddon. Owing to the density of the adhesions, portions of the cyst wall adherent to the intestine were left behind at the conclusion of the operation. After the insertion of a gauze drain into the pelvis, the remainder of the abdominal incision was closed. There was some suppuration during convalescence.

Patient was readmitted Nov. 1, 1901. Four days before admisssion, after lifting a heavy weight, patient was seized with severe abdominal pain and vomiting which has persisted and become fecal. The constipation has been absolute with the exception of one slight movement following an enema on the first day after the attack began. Since then there has been no discharge of fecal material or flatus. There has been marked

prostration. On examination, the abdomen is prominent especially in the lower right and median zones. There is slight rigidity and tenderness over the tumefaction. Deep palpation under an anesthetic elicits a soft movable and slightly elastic mass. Vaginal and rectal examination negative. On admission, temperature is 100° F., pulse 132, and weak. Patient is in a condition of severe collapse.

Operation under ether. A median incision was made through the old scar and the peritoneal cavity opened. After the sponging away of free bloody fluid the intestine presented in a greatly distended condition and of dark purple color. Just above the ileocecal junction, the small intestine passed beneath a band by which it was tightly constricted, the intestine below being collapsed. The ligation and division of the band was followed by the gradual filling of the intestine below. No other constriction was found. The band seemed to pass from the mesentery over the intestine to the posterior parietal peritoneum and had no connection with any of the pelvic organs. The abdominal cavity was washed out with warm saline solution and closed quickly with sutures through the entire thickness of the wall, as the general condition of the patient was rapidly becoming weaker. Notwithstanding lavage, and infusions, the collapse became more marked and death occurred thirty-six hours after the operation.

Case IV.—J. R., aged nine years. Acute obstruction from constriction of a Meckel's diverticulum. Laparotomy. Recovery. Death six months later from some form of obstruction. Admitted to the hospital April 4, 1902. On the day before admission, patient was seized with severe colicky abdominal pains, situated about the umbilicus. There was vomiting from the very beginning, repeated at intervals of fifteen minutes during the night. Two enemata were given without any result and without bringing away any flatus. There was considerable prostration. One week before admission, patient fell, striking abdomen against the edge of a table, the accident being followed by slight pain of short duration.

On examination, the abdomen was generally distended, the left flank projecting slightly more than the right. There was slight tenderness all over but no distinct rigidity. No mass could be felt. There was some dulness in the left flank shifting with the change in the patient's position. Peristalsis could seldom be heard and is very faint. The pulse is 104, respiration 34 and temperature 98.6° F. There was 18,000 leucocytosis.

Operation under ether. The peritoneal cavity was opened by a median incision about 4 inches long beneath the umbilicus. It contained a moderate amount of clear serous fluid. To the right of the median line at a point just above the umbilicus a loop of small intestine had become caught beneath a Meckel's diverticulum which still remained attached to the umbilicus by a firm fibrous cord. This was excised, the diverticulum removed and the stump closed with a catgut suture and thoroughly cauterized. The abdominal cavity was irrigated with a warm saline solution, and the wound closed without drainage.

After the operation there was moderate nausea and vomiting, the latter persisting to the fortieth hour and then yielding to lavage. There was slight abdominal distention during this same period with restlessness, and the pulse varied between 100 and 120, the temperature ranging around 101° F. On the third day after operation a moderate amount of abdominal pain still persisted. This rapidly disappeared when flatus was expelled, and shortly after the bowels moved after enema. Primary union was secured and the remainder of convalescence was uneventful. Six months afterward the patient is said to have died with symptoms of obstruction at some place out of town.

Case V.—J. E., male aged 29 years. Admitted to the Presbyterian Hospital June 10, 1902, for chronic intestinal obstruction, which was followed by operation for suppurative appendicitis.

Two years ago patient was operated on in Germany for a suppurative appendicitis with subsequent drainage. Patient was in bed for four months after operation. Since that time the bowels have always been constipated, especially during the past six months, and for the past two weeks patient has been troubled with constant severe pain in and above the upper extremity of the old scar. Two days ago, while lifting a barrel, a swelling the size of a small orange appeared in the cicatrix, which disappeared spontaneously in about ten minutes. Shortly after this there were occasional attacks of vomiting, which persisted up to the time of admission. During the past forty-eight hours there has been no movement of the bowels. On admission the pulse is 80, the temperature 100° F.; patient complains of considerable pain. An enema was followed by a satisfactory movement of the bowels. On examination, there is an old scar about four inches long over the appendix site, between the anterior superior spine and the umbilicus. There is no distention. There is a distinct area of resistance between the upper edge of the scar and the umbilicus, about the size of an egg, and this area is tender on deep pressure. Repeated examinations of the blood never showed a leucocytosis higher than 9,000. The patient was placed in bed, and the diet regulated. The pain, however, and the local resistance persisted, notwithstanding regular movements of the bowels.

Operation on June 20 under ether. The scar was excised by means of an elliptical incision which was deepened along the edge of the cicatricial tissue until the peritoneum was opened. The cecum presented adherent to the parietal peritoneum and from the end of the anterior fibrous band, the stump of the appendix, about an inch in length, extended up and inward to a point on the parietal peritoneum where it was closely adherent. In the aperture so formed a loop of small intestine had become imprisoned and was moderately constricted. The adhesion was divided,

the appendix amputated and the intestine released. The stump of the appendix was buried with a purse string suture of catgut, and the muscular and aponeurotic planes of the abdominal wall were approximated with chromic sutures without drainage. Primary union was secured, the convalescence being uneventful.

Case VI.—D. W., aged 22 years. Acute obstruction following a previous internal operation for appenditicitis. Recovery.

On May 16, 1902, patient was operated on by the intermuscular incision for appendicitis. The distal end of the appendix was atrophied and adherent to the iliac fossa. There was no pus. Its removal was accomplished without difficulty and the wound was closed without drainage, primary union being secured and the patient leaving the hospital in three weeks. The stump of the appendix was tied with heavy catgut and cauterized. No attempt was made to bury it with a purse-string suture. Patient remained well until Oct. 1, 1902. In the interval there had been occasional attacks of pain in the right inguinal region intensified by walking and during menstruation. The bowels had remained fairly regular until two days before admission, when patient was seized with severe abdominal pain and persistent vomiting. During this time there has been no movement nor the passage of any flatus. The past few hours the vomiting has become brown, but is not of a fecal odor. On examination, the abdomen is slightly distended throughout. There is tenderness and rigidity, most marked just internal to the old appendix scar. No mass can be felt. The abdomen is tympanitic in front as well as in the flanks. General condition is that of very marked prostration, the pulse being 120 and the temperature slightly above normal.

Immediate operation under gas and ether. A median incision four inches in length was made below the umbilicus, opening the peritoneal cavity, which contained a small amount of clear serous fluid. The small intestine was moderately distended and was caught beneath a firm band, extending from the omentum to what appeared to be an appendix epiploica on the wall of the cecum, but which may have been the region of the former appendix. The band was divided, the intestine released, and the cecal attachment of the band buried with a purse-string suture of catgut. The abdominal cavity was irrigated with a hot saline solution and was closed without drainage. Uneventful recovery. Primary union.

Case VII.—J. K., aged 22 years. Penetrating pistol shot wound of the abdomen. Laparotomy; recovery. Acute obstruction from a band and from kinking of the small intestine six months later; laparotomy; recovery.

Patient has always been robust. In June, 1902, patient received a pistol shot wound of the abdomen and was taken in an ambulance to Gouverneur Hospital, where, two hours after the accident, a laparotomy was performed, and eight wounds in the wall of the small intestine and two in the mesentery were closed with sutures. In order to minimize the risk of subsequent adhesion, each perforation, with the exception of two, which were in close proximity to the mesenteric border, were closed with purse-string suture of silk and one suture over this to secure firm apposition. The bleeding vessels in the mesentery were ligated with catgut. A very moderate amount of gauze drainage was introduced to the point of suture and the abdomen elsewhere closed. The patient made an uneventful recovery; the patient passed flatus twenty-four hours after the operation and on the second day the bowels moved to enema. At no time was there any nausea or vomiting. Primary union was secured except at the central part of wound through which the drain protruded, and this was closed entirely by granulation by the end of the fourth week. Since then the patient has enjoyed excellent health until five days before his admission into the Presbyterian Hospital. At that time, about six months after the primary operation, patient was seized with severe colicky abdominal pain and persistent vomiting. There was complete constipation, and the patient was admitted to the hospital in a condition of collapse, with a pulse of 120 and temperature of 102° F. On examination, the abdomen was greatly distended and everywhere rigid. The greatest pain and tenderness was just above and to the right of the umbilicus. The tympanitic note was general.

Operation on Dec. 24, 1902, under gas and ether. The peritoneal cavity was opened by a median incision just above and below the umbilicus. There was a considerable amount of clear serous fluid within it, and the intestine immediately presented in a greatly distended condition. In the lower part of the cavity other loops of intestine in an extremely collapsed condition were observed. A strong band extending from the omentum to the posterior parietal peritoneum with the small intestine beneath and tightly constricted by it was found in the posterior part of the abdominal cavity on the right side at about the level of the umbilicus. This was divided and the intestine released. In addition, loops of small intestine were found adherent to each other and to the mesentery and when these were divided and the intestine straightened out the adhesions were seen to have formed at the points where the previous intestinal and mesenteric perforations had been closed, the silk sutures being still plainly visible in the wall of the intestine. The separation of these adhesions left denuded areas so extensive that they could not be covered satisfactorily with any serous investment. They were accordingly covered with Cargyle membrane, and the intestines returned into the abdominal cavity after they had been thoroughly washed and the abdominal cavity carefully irrigated with hot saline solution. The abdomen was closed without drainage.

After the operation the patient was restless and at times delirious. He was given early and repeated rectal injections containing turpentine, and the sides and extremities of the bed were alter-

nately elevated and lowered. The bowels moved abundantly from the second day. The delirium ceased on the fifth day, and from then on the convalescence was uninterrupted. Primary union was secured. At the end of about three weeks patient left the hospital. About five weeks after the operation patient had some abdominal pain and vomiting, continuing for about twenty-four hours, which he ascribed to some indiscretion in diet. Since that time, however, the patient has been completely well.

MEDICAL PROGRESS.

SURGERY.

Complications of Artificial Anus.—In a paper dealing with this subject, H. GÉRAUD (Rev. de Chir., August 10, 1903) takes up the pathogenesis, etiology, symptomatology and treatment of two of the most frequent complications, namely: Prolapse of the mucous membrane, and prolapse of the intestine itself. Eversion of the mucous membrane is usually present in artificial anus; but exaggeration of this condition may lead to more or less marked prolapse and constitute a real complication. In this event, a mucous cylinder is seen which may be from 3 to 11 cm. in length. This, at first thin, supple, and easily reduced, becomes thickened, ulcerated, and irreducible; in which case a radical operation is indicated. This latter consists in resection of the protruding mucous membrane; a sufficient margin being left to permit suturing the membrane to the cutaneous orifice. Prolapse of the intestine is simple or double, according as one or both ends protrude. It is usually preceded by eversion of the mucous membrane; the latter being forced out under the influence of intra-abdominal pressure and at a given moment, the intestine following it. The intestinal opening having no sphincter, there is nothing to oppose its escape. A large abdominal orifice is the most potent predisposing cause of prolapse of the intestine; the determining cause frequently being some muscular effort. Prophylactic treatment is most important. The patient should be advised to accomplish defecation in the horizontal position and without effort of the abdominal muscles. Violent exertion, overfatigue, and excess of nourishment should also be interdicted. The chief point, however, is the use of such an appliance as will allow the escape of gas while still exerting pressure, not only upon the borders, but upon the whole orifice. If the prolapsed intestine is reducible it may be replaced and sutured in position; or the mass may be excised like a tumor, the subsequent treatment being like that used by Mikulicz in prolapsus of the rectum. In the event of irreducible prolapse, ablation is imperative and the author favors Gosset's method.

Toilet of the Peritoneum in Appendicitis.—No one method is suitable for all cases, for they vary much in the extent of operative work required, and in the difficulties encountered. According to S. H. WEEKS (Ann. of Gyn. and Ped., August, 1903), when the operation is made before pus has formed, or during the interval between the attacks, no pus being present, no drainage is necessary. The appendix being removed, and the region being dried with pads of sterile gauze, the external wound is completely closed. Where there is a circumscribed abscess, care should be taken not to infect the general peritoneal cavity by forcible irrigation, which is liable to force the purulent pus among healthy intestines. The wound and abscess cavity should be packed with sterile gauze. Where the wall of the abscess is firmly adherent to the anterior wall of the abdomen, and can be opened without opening the uninfected abdominal cavity, this should be done. The point of adhesion should be carefully searched for, and the abscess opened at this point. Careful search should be made for concretions, as the neglect to find and remove them may lead to a troublesome sinus. Here the abscess cavity should be carefully evacuated and cleansed with gauze pads, on irrigation, which can be safely used without fear of infecting the healthy peritoneum, after which the whole cavity should be packed with gauze. The greatest care should be taken not to break down the abscess wall at any point. A fourth and a very important class of cases includes those in which there is no protecting wall of adhesions, and the products of a septic peritonitis have flooded the whole abdominal cavity and the intestines are floating, so to speak, in the septic fluid. All these cases require the thorough removal of the septic fluid and a cleansing of the intestines, which sometimes may require their removal from the abdominal cavity. This cleansing is best done by means of irrigation, several times repeated. After thorough cleansing by irrigation and sponging, a glass drainage-tube, open at both ends, and a strip of gauze pushed through it from end to end, should be passed well down into the pelvic cavity, and the whole infected area packed with gauze. Strips of gauze should be packed in various directions among the intestines, so that perfect capillary drainage may be secured throughout.

Detachable Plaster Cast.—An ingenious method of applying a plaster cast, which will permit the carrying out the more modern treatment of fractures by combined immobilization and massage, is described by C. O. BECHTOLD (Jour. Am. Med. Ass'n., September 5, 1903). The cast is applicable to any part of an extremity where a cast or a splint can be used, but for convenience, he details that intended for a Pott's fracture. The novel element is the employment of a Gigli saw. The limb is covered with a stocking or wrapped up in cotton and a Gigli wire saw applied in the median line anteriorly and posteriorly. Both of these are secured by a few turns of plaster bandage and a third saw is applied along the sole of the foot and similarly secured. The cast is then completed by successive turns of the plaster bandage, but is made somewhat thicker than usually. Care must be taken to leave the ends of the saws free, and not to bend them at sharp angles. As soon as the cast is completed and before it dries, it is cut through by means of the saws, which may be readily accomplished in about ten seconds. A roller bandage is then applied to hold the two halves of the cast together. When they are fully dried, they may be removed as often as necessary for the application of massage, hot applications, and inspection.

The Omentum as a Protective Organ.—It is only within the last few years that the importance of this organ has come to be recognized. Its function has, however, never been thoroughly investigated, and the animal experiments of E. RENZI and G. BOERI (Berl. klin. Woch., August 24, 1903) should therefore prove of general interest. They investigated the function with especial reference to other abdominal organs, particularly the spleen. If the main stem of the splenic artery or vein in a dog is tied off, the spleen, after 2 1-2 months, still retains its integrity, and the circulation is almost undisturbed. It is probable that the omentum sustains the circulation, at least in part, for it is often found lying on the spleen, its vascularity is increased, and in separating the adhesions, considerable bleeding is caused. This activity of the omentum in restoring the inhibited circulation affords encouragement for such operations as

that of Talma's for a disturbed portal circulation. If the blood supply to the spleen is entirely cut off, the organ becomes necrotic. But even after several days the omentum is observed to have surrounded the organ and in ten days it has formed a dense network around the spleen, in the center of which lies the organ, encapsulated, diminished in volume, and in a state of disintegration. After twenty days, it is no larger than a nut, and enclosed in a fibrous capsule with walls about 2 to 3 mm. thick. In 2 1-2 months there is scarcely any trace of the spleen left, except a small fibrous nodule, almost complete absorption having evidently taken place. The animals gave no symptoms of this process going on in their interior. If the circulation is entirely cut off and the omentum excised as much as possible, encapsulation does not take place, the spleen becomes necrotic, but no absorption follows, and the animal dies within twenty-four to forty-eight hours. If this operation is done in two stages, the vessels being tied off about eight to ten days after the omentum has been extirpated, death does not come on until three to ten days later. Neither one of these operations alone is fatal, but death is caused when both are done together, and is due, the authors believe, to the extraordinary toxic qualities of the disintegration products of the splenic tissue. The absorption of these is more or less hindered by the encapsulation produced by the omentum. It was also determined that the same thing took place when a kidney was tied off; encapsulation by the omentum being followed by slow degeneration and subsequent absorption. Foreign bodies introduced into the peritoneal cavity were likewise surrounded by the omentum, and apparently remained without causing any further trouble. The authors believe that these observations not only clear up the question as to what becomes of certain internal organs which may become cut off from their circulatory supply, but also serves to indicate certain therapeutic applications which are rendered possible by what is now known of the functions of the omentum from these experiments.

A New Method of Reducing Posterior Dislocations of the Hip.—The following new method for sciatic dislocations of the hip is described by J. ELGART (Centralbl. f. Chirurg., August 22, 1903): The narcotized patient is placed on the floor, his dislocated limb held over the knee of the surgeon, with the patient's knee at right angles, and the pelvis steadied by an assistant. By seizing the leg at the ankle and pressing downward the head of the femur will move upward, the surgeon's knee acting as fulcrum. Inward rotation of the femur is also practised by pushing the leg outward. With the free hand, the prominent head of the femur is seized and pressed outward so as to assist its gliding over the cartilaginous ring.

Acoine and Cocaine for Local Anesthesia.—Good local anesthesia has been obtained by W. KRAUSS (Münch. med. Woch., August 25, 1903) by means of a solution containing acoine 0.025 gm. (½ grain), cocaine 0.05 gm. (1 grain), physiological salt solution 5 gms. (1¼ drams). The solution should be prepared fresh. The best results were obtained in (1) Enucleation of the eye. A syringeful is here injected along the muscular insertion of the recti muscles. (2) Strabismus operations of children and sensitive adults. Half a syringeful into the neighborhood of the muscle will suffice. (3) Small operations upon the conjunctiva. (4) All operations upon the lids. (5) Extirpations of the lacrymal gland or sac. (6) Occasionally for operations in the vicinity of the eye, as in the removal of dermoids.

Treatment of Penetrating Abdominal Wounds.—It is a mistake, according to H. GERELE (Münch. med. Woch., August 18, 1903) to treat penetrating abdominal wounds in civil life, according to the same conservative principles as during war. In peace, the conditions of asepsis are better and the bullets have less force of penetration, and cause larger perforations of the gut, so that an early laparotomy is almost always indicated, especially since the symptoms of perforation or hemorrhage often make their appearance too late. Secondary abscess, perforation, and the formation of strictures, so common after expectant treatment, are also avoided. Intestinal wounds are best managed by intestinal resection and suture or Murphy button. Hepatic hemorrhage ceases after suture with heavy catgut. Injury of the spleen calls for splenectomy. Shock is no contra-indication for operation, but ether should be employed. Otherwise chloroform, preceded, if possible, by several doses of strophanthus, is the best anesthetic. Local anesthesia will hardly ever be applicable on account of the unavoidable traction on the parietal peritoneum. Postoperative shock requires subcutaneous salines. To avoid paresis of the intestines, the operation is performed as rapidly as possible, and a rectal tube is inserted soon after the wound is closed. If flatus is not expelled in twenty-four hours, 100 to 150 cc. of pure glycerin is injected through the tubes. In 3 to 4 times twenty-four hours the patient may receive small doses of castor oil. The injection of an aperient into the intestines during operation may also be tried. Atropine has had no effect in the writer's hands, but the paresis sometimes disappeared after two daily doses of one milligram of physostigmine salicylate.

Spinal Cocainization with the Addition of Adrenalin.—After the enthusiasm of several years ago had subsided, spinal anesthesia has gradually gone out of fashion, and it is doubtful if to-day it is still practised as routine in any clinic. The great danger of intoxication is responsible for this, but luckily experiments have not been wanting to reduce the risk and thus save an otherwise excellent method from complete oblivion. A. DÖNITZ (Münch. med. Woch., August 25, 1903) reports a number of experiments in cats, on the combined use of cocaine and adrenalin. Where both drugs were injected simultaneously, three times as much cocaine was necessary to kill the animals; if the adrenalin was injected six minutes before the cocaine, five times as much was required. The adrenalin itself in the usual dose is innocuous to both man and animals. The experiments were then repeated with surgical cases, and it was found that a much smaller dose of cocaine was necessary to bring about the desired anesthesia. The most severe operations could be done after half a centimeter of adrenalin solution (1:1000) diluted with the same amount of water and followed by 0.0075 to 0.015 cocaine. After effects were slight or absent entirely.

Electrothermic Hemostasis.—The following are the advantageous features that are claimed for this method when the Downes instruments are employed by A. GOLDSPOHN (Am. Jour. of Obst., August, 1903): (1) Patients are more comfortable after operation, because the nerves so treated in the stumps are insensitive, which is not true in the ligated stump; (2) as these pedicles are probably sterile, and become disintegrated and absorbed, they cannot give rise to adhesions of viscera, as we know that ligated stumps so often do. (3) There is less blood lost, because this procedure is complete and wholly an antecedent or preventive one, which is not so true of hemostasis by ligation, in which it is often better to avoid the formation of large stump by preceding ligation en masse, and to tie the individual spurting vessels after the severing incision has been made. And when this cut is made within the extent of the band of baked tissue, as can be done after the larger

forceps have been used, there is no show of blood on either side of the incision. (4) This method of hemostasis is certainly more nearly ideal, because it does not involve the introduction of a foreign body, and it is more nearly ideally aseptic than is the use of any kind of ligature material which always implies the possibility of its not being aseptic, either from defective preparation or from manipulation with the only omnipresent instruments (the hands), which cannot be boiled. (5) In vaginal hysterectomy it is superior (*a*) in cancer cases, because it most nearly destroys the tissues which otherwise compose the stumps or pedicles, and thereby diminishes the chance for a recurrence, both from imperfect removal of diseased tissues and from implantation or from manipulation with the only omnipresent in every instance of this operation it is of distinct advantage, because it does away with a most difficult and tiresome form of ligation, and also the very objectionable use of clamps, etc.; (*c*) thereby facilitating a very important part of the operation, *e.g.*, closure of the intestinal cavity and an avoidance of a very important chain of intestinal disorders, which so often follow the sojourn of a foreign body within the peritoneal cavity; (*d*) by avoiding ligatures, it avoids danger of secondary hemorrhage, and also of infection from such ligatures, when they become infected before they are absorbed or cast off.

PHYSIOLOGY.

Heat Production and Metabolism of the Embryo.—That the embryo of warm-blooded animals is subject to a very active metabolism, and that the developmental processes are accompanied by marked transformations of energy, are maintained by C. BOHR and K. A. HASSELBALCH (Skand. Archiv f. Physiol., July 23, 1903). They find that the value of the respiratory quotients, as well as a consideration of the chemical constituents of the egg and of the heat produced by oxidation of the egg, leads to the conclusion that the respiratory metabolism during the development of the embryo of the hen, is the result of the oxidation of the fatty constituents. The amount of energy estimated upon this basis, corresponds to the amount of heat that is produced during the entire period of embryonic life. As there is no ground for assuming that any other tissue than fat is a source of energy during embryonic existence, the authors believe that all the chemical energy produced in such large quantity leaves the egg solely as heat and is in no way concerned in the formation of new tissue.

The Action of Glycerin and Veratrin on Striated Muscle.—The interesting field of neuromuscular physiology is richly extended by the important discovery by C. G. SANTESSON (Skand. Archiv f. Physiol., Vol. 14, Nos. 1, 2 and 3) that in frogs injected with large doses (.5 to 1. gm.) of glycerin, if the nerves or muscles be afterward stimulated by means of very weak induced opening shocks, there occurs not a minimal single contraction but a tetanus of extreme height enduring for a long time. Curare does not prevent this action of glycerin on the muscles but reduces the excitability of the latter to a marked degree. If two muscle-nerve preparations from a frog poisoned with glycerin be examined, it is found that the one which is tested the later shows a greater excitability to induced shocks. The current of action produced in a pulsating frog's heart is sufficient to throw a muscle poisoned with glycerin into tetanus. Applied to a muscle directly, strong solutions of sodium chloride, sugar, veratrin and glycerin produce a more or less pronounced contracture, the last, however, increasing the muscular irritability besides. The veratrin-contracture with its slow rhythmical undulations remind one of the wave-phenomena inherent in sarcoplasm, as studied by Fano, Bottazzi and others. The following differences are noted between the contracture of veratrin and the tetanus of glycerin. The latter increases irritability more than veratrin. The form of the glycerin-curve is that of a tetanus; the form of the veratrin curve is one of a single contraction with contracture superadded. Continued stimulation increases the response in veratrinized muscle but diminished it in glycerinated muscle. There are marked differences in the form of action-current produced in these two forms, the latter displaying during the period of tetanus a continued vibration. The glycerin-tetanus spreads to neighboring muscles and seems to depend upon the fact that the muscle rendered abnormally irritable by the glycerin, is stimulated again and again for a long time by its own currents of action. While veratrin acts chiefly upon the sarcoplasm, glycerin affects all the structures of the muscle. Microscopical examination reveals in glycerinated muscle certain gaps in the periphery of many fibers. The significance of these is unknown. No coagulating effect of glycerin has been observed, its influence depending probably upon its power to extract water. The strength of this tetanizing power of glycerin depends, in the author's opinion upon the ease with which glycerin osmoses into the substance of the muscular fibers, increasing their irritability and conductivity. That an agent like glycerin, which, by virtue of its influence on the physicochemical properties of the muscle and only these, produces its effect, in the form of such uncommonly powerful changes in the functional capacities of this organ, is an argument in favor of the doctrine that the muscular contraction is brought about by a change in which physicochemical forces play the leading rôle.

Contributions to the Phenomena of Narcosis.—In studying the effect of narcosis by means of nitrogen gas upon the structures of the nervous system, F. W. FRÖLICH (Zeitschrift f. Allgemeine Physiol., Vol. 3, No. 1) found that nerves and nerve-cells are affected in the same way—in both narcosis diminishes the assimilation of oxygen. The oxygen that is stored up in the nerves is dependent on the partial pressure of this gas and can, in spite of deep narcosis, leave the nerve unhindered.

Effect of Thyroid Feeding on Nitrogenous Metabolism.—In treating a case of myxedema, J. A. ANDERSON (Skand. Archiv f. Physiol., Vol. 14, Nos. 1, 2 and 3) observed that thyroid medication brought about an increase in the metabolism of proteids, and that this increase cannot be prevented by excessive feeding of fats and carbohydrates. The author maintains that the thyroid gland elaborates a substance which stimulates the processes that make for the disintegration of the tissue-proteid.

The Elective Conductivity and Osmotic Pressure of Animal Tissues.—In an investigation of various tissues (heart and spleen of the turtle and muscle of the frog), G. GALEOTTI (Zeitschrift f. Biologie, Vol. 45, New Series, Vol. 27) finds that during the transition from life to death there is a reduction in electric conductivity, while the molecular concentration remains the same. From this it is concluded that during the process of death the reactions of the protoplasm are changed in such a way that the number of free ions is diminished, while the number of actively osmotic molecules is subject to little or no variation. It is possible to bring about similar reactions between proteids and certain salts artificially. They are of eminent significance from the standpoint of the physicochemical investigations of the proteid bodies. The onset of putrefac-

tion is accompanied by a marked increase in electric conductivity and molecular concentration, which can easily be explained if one take into consideration the fact that the splitting processes accompanying putrefaction cause a marked increase in the number of ions, and of electrically neutral but osmotically active molecules.

The Source of Indican in the Animal Body.—It has been established by experiment and clinical observation according to H. SCHOLZ (Hoppe-Seyler's Zeitschrift, June 19, 1903), that as the result of the activity of certain bacteria in the intestinal canal and in other regions (*e.g.*, in the pus of empyema), indol is formed, which, after absorption, is excreted in the urine as a salt of indoxyl sulphuric acid, namely, indican. It has been maintained by many authors that there are other sources besides bacterial putrefaction for indican. Its excretion in large amounts in fasting animals suggested the hypothesis that indol may be formed by the non-bacterial disintegration of albumin. Observations made by many authors in fasting animals and human beings have failed to find a constant verification of this phenomenon. Clinical observations have suggested many morbid conditions in which indol has been supposed to result from non-bacterial decomposition of albumin. Senator observed a much more marked indicanuria in chronic than in acute diseases, particularly in chronic wasting and inanition disorders. Other diseases in which an increased indican output has been observed, are gastric carcinoma, pleurisy, pneumonia, progressive phthisis, glycosuria and Addison's disease. The indicanuria accompanying alimentary glycosuria, as observed by Gilbert and Weil, was prevented by the administration of liver-extract. In none of the above diseases have all observers been able to confirm the statement that an increased secretion of indican results. Moreover, in no instance has there been excluded the possibility that the condition of the bowels and the form of diet (*e.g.*, meat diet in diabetes) might have been the cause of a bacterial indicanuria. Moreover it has not yet been proved that the microbic agents in certain infectious diseases in which indicanuria has been observed, are not able to cause the formation of indol. Again, authors have contented themselves with a mere qualitative determination of indican, which is, of course, unreliable. Some investigators, by means of injections of small non-toxic doses of oxalic acid and phloridzin, have been able to produce indicanuria. These observations the author has not been able to confirm. He reaches the conclusion that an increased indicanuria following causes other than putrefaction has not been proved.

Blood Change After Hemorrhage.—In comparing the effect of hemorrhage upon the composition of normal blood with that during the administration of iron and arsenic, E. P. BAUMANN (Jour. of Physiol., Vol. XXIX, No. 1), finds that hemorrhage produces a general deterioration of the blood and serum, especially of the former. The leucocytes are increased, the change consisting chiefly of an increase of the polymorphonuclear, occasionally of the mononuclear cells. The specific gravity of both blood and serum is less altered than the remaining factors. The solids, proteids, and total nitrogen of both blood and serum are more or less equally affected. The qualitative change in the serum-proteids consist in an increase of serum-albumin at the expense of the serum-globulin. The fibrin is increased and the coagulation rate shortened. The blood-ash remains practically unchanged. Hemorrhage during the administration of inorganic iron produces a general deterioration of the blood and serum, the latter being considerably less affected than by hemorrhage alone. The hemoglobin is increased above its original value, while the red corpuscles are even more diminished than by hemorrhage alone. The leucocytes, both quantitatively and qualitatively, are affected as by hemorrhage alone. The same applies to the specific gravity of both blood and serum, and to the solids, proteids and total nitrogen of the blood. The solids, proteids and nitrogen of the serum are affected in varying degrees. The alteration in the fibrin and the coagulation rate correspond to those produced by hemorrhage alone. Hemorrhage during the administration of organic iron produces alterations in the blood and serum closely resembling, but less pronounced than those under hemorrhage and inorganic iron. Hemorrhage during the administration of arsenic produces changes in the total blood which in every respect closely resemble those caused by hemorrhage alone, with the exception that the number of leucocytes is diminished instead of increased. The condition of the serum, however, resembles that produced by hemorrhage and inorganic iron, *i.e.*, it is better than under hemorrhage alone, but not so good as in hemorrhage and inorganic iron. Hemorrhage during the combined administration of iron and arsenic produces a degree of deterioration which is much less marked than that produced during the administration of either of these drugs singly.

The Nature of Adrenalin Glycosuria.—The subcutaneous administration of adrenalin in dogs and rabbits causes a true glycosuria and glycemia, according to D. N. PATON (Jour. of Physiol., Vol. XXIX, No. 3), the degree of which depends largely upon the amount of carbohydrates in the body, but which occur when stored carbohydrates have been eliminated. The glycosuria is apparently due to a diminished utilization of sugar in the tissues, since it is not due to a mere increased formation of glucose or to increased excretion of sugar by the kidneys. That the effect is due to a toxic action of the adrenalin and that it is not caused by an interference with the processes of oxidation due to the vascular changes, is indicated, first, by the extent of the glycosuria—which is far more marked than that observed as the result of mere interference with oxidation, and secondly, by the fact that the glycosuria is slight in guinea-pigs where the vascular changes are much more prominent. The observations of Herter support the view that the toxic action is not a direct one, but that it operates through the pancreas. During the prolonged daily administration of adrenalin, days may occur on which sugar does not appear in the urine. A distinct tolerance of the drug is established. Diacetic acid and aceton have not been detected in the urine of dogs, but a dark red ring at the junction of the urine with nitric acid is constantly present. The study of the proteid metabolism shows (1) That the sugar is not entirely derived from the breaking down of proteids, (2) that there is a markedly increased production of ammonia and (3) that, on an insufficient diet, the decomposition of proteids is markedly increased, while the absorption of proteids is not interfered with. The proteid metabolism under adrenalin thus benaves as it does in ordinary diabetes.

Exercise and Urinary Secretion.—The early excretion of sulphuric acid appears to be a constant feature in the metabolism which accompanies rapid muscular exercise, according to G. C. GARRATT (Jour. of Physiol., Vol. XXIX, No. 1). The acid seems to pass out in combination with potassium and ammonium, and the maximum output occurs several hours before that of total nitrogen. The increased excretion of phosphoric acid resulting from exercise bears close relation to that of free acid and urea. The acid appears to be eliminated chiefly in combination with the alkaline earths and am-

monium. The normal relation between sodium and chlorine does not seem to be conspicuously disturbed by exercise, nor is the usual influence of increase in the urinary water upon them prevented thereby.

The Nature of the Pancreatic Ferments.—Arguing from the results obtained in previous investigations and in the one on the precipitability of pancreatic ferments by alcohol, H. M. VERNON (Jour. of Physiol., Vol. XXIX, No. 3) concludes that the tryptic and rennetic ferments do not exist as independent chemical entities. On the contrary they form a single complex molecular group, of which various side-chains possess various powers, as of digesting proteids or of coagulating milk, which can be independently exerted. Moreover, these side-chains possess various degress of stability, and it is possible for them to be destroyed, one at a time, without the activity of the remaining side-chains being in any way affected.

The Spleen and Hemolysis.—The physiology of the spleen is still the subject of diligent investigation and heated debate. It has recently been shown that this organ has no important action as a blood forming organ. In studying the experimental evidence of the connection of the spleen with the breaking down of the blood cells, D. N. PATON and A. GOODALL (Jour. of Physiol., June 15, 1903) find that the removal of the spleen is not followed by any rise in the number of erythrocytes or leucocytes. The excess of erythrocytes added to the blood by injecting the defibrinated blood of animals of the same species, disappears at the same rate in animals with and in animals without the spleen. Hemolytic agents my be divided into (*a*) solvents of hemoglobin from the erythrocytes and (*b*) toxic agents to the erythrocytes. Injection of the first class (water) leads to an exactly similar hemolysis and recovery in the normal and in the spleenless animal. The injection or administration by the mouth of the second class (phenylhydrazine and toluylendiamine) causes the following changes in normal and in spleenless animals: (1) A great destruction of both red and white cells results in an anemia which in many features closely resembles pernicious anemia, but which is completely recovered from about the twentieth day. (2) In the organs there is a very great deposit of pigment, which gives the reactions of free iron, occurs most markedly in the spleen (when present) and next most markedly, in order, in the lymph-glands, bone-marrow, kidney, liver and cortex of the suprarenal capsules. Most of the pigment is contained in cells—large leucocyte, or endothelial cells—or is deposited along the fibrils of connective tissue. The splenic reticulum may thus be mapped out by the pigment, active regenerative changes, leucoblastic and erythroblastic, are confined to the bone-marrow where megaloblasts are also found when the regenerative changes are most marked. These megaloblasts indicate a reversion to the fetal type of blood formation and are only found in the circulating blood of man in pernicious anemia and a few allied conditions. The only difference between splenectomized and normal animals is that about the fourth day a slightly less degree of anemia is produced in the spleenless animal, because of the less rapid and complete removal of the dead erythrocytes from the circulation. The anemia induced by feeding rabbits upon a diet poor in iron and proteid (rice), is more marked in spleenless than in normal animals, the spleen apparently acting as a storehouse for iron, which would otherwise be lost. There is thus no evidence that the spleen has any active hemolytic functions. It is rather a scavenger of the blood, removing dead erythrocytes, breaking down the hemoglobin and retaining the iron for use in the regeneration of the blood cells.

PEDIATRICS.

Antenatal Rigor Mortis.—Rigor mortis is to be considered an unfailing sign of death and, according to the now almost generally accepted theory of Brücke, which has been proved by experiment, it results from a coagulation of muscular albumin. As the fetus is endowed with muscular structure the same as the child or adult, says C. E. PADDOCK (Am. Jour. of Obstet., August, 1903), it is subject to many of the diseases of later life. Certain of its muscles are subject to constant use for weeks before its birth and are subject to external stimuli. This being so, what reason have we for not believing that rigor mortis exists in the dead fetus? Proof that it does and that it has been recognized for many years has been shown in reported cases. The first reported case was that of of Chowne, Lancet, 1840. In the reported case the cause of death of the fetus may be summarized as follows: In 13 labor was complicated by hemorrhage, viz., in 4 placenta previa, in 8 accidental hemorrhage, in 1 varix. In 2 there was eclampsia and in 5 there was contraction of the pelvis and rigidity of the cervix, in 2 there were twins, and in 1 acute peritonitis, in 1 prolapse of the cord. Granting that rigor mortis occurs in the fetus the question might naturally be asked, How can the fact be explained that the condition is so seldom recognized? In answer to this the author says that often the fetus has gone through the rigid state before birth; again, owing to the feebleness of the muscles, rendered so by disease of the mother or fetus the rigor mortis is too feeble to attract the attention of the physician. Again, the fetus may be born before the rigor mortis commences. In this case the diagnosis of death has been made, and no further thought is given to it. Usually the death of the fetus occurs in the later stage of labor and delivery soon follows instrumentally or normally. Should the condition occur during the first stage or induced by operative procedure the condition is not usually noticed; the physician naturally gives his attention to the living patient, rather than to the dead child. The passage of the child through the birth canal may soften the fetal musculature and joints and so alter the condition, even though it be one of advanced rigor mortis, and it may not again resume rigidity. Cases are reported where the physician has practised artificial respiration on a child, blue and rigid, with the fetal heart beating, although the child was dead and in rigor mortis. The author has heard the fetal heart beat one hour and a quarter after birth, though there had never been any respiration. From a medicolegal standpoint it must be admitted that rigor mortis can occur before birth as well as after. The existence of a new-born dead infant in rigor mortis is not necessarily proof of life apart from a mother, that is of independent existence. It does prove, however, that the fetus was alive shortly before or during birth. Post-mortem changes can thus occur in the dead fetus as well as in the dead adult body and that the condition in each is regulated by the same laws. Furthermore, that the condition often complicates delivery by interference with its normal mechanism.

Diseases due to Faulty Nutrition.—The three most marked of these are rickets, scurvy and infantile atrophy, and W. N. SULLIVAN (Pediatrics, Aug., 1903) assumes that their chief etiologic factor is faulty feeding. Mothers think that the child will grow better if its food is strong, so they give whole milk at an early age, potatoes, meat and other such foods. It is claimed that rickets does not exist in Japan where the fats and oils of fishes and the blubber of whales enter plentifully into the diet. Young monkeys taken from the mothers and fed with vegetables and fruit and puppies fed on

meat develop rickets. Cheadle states that twenty litters of lions died successively of rickets, and the next brood grew up healthy on a diet of cod-liver oil, bones and milk. Milk, however good, unless properly modified, is not always a sound food for the child. Scurvy is most common from the ninth to fourteenth month and lack of fresh food is the most important cause. Proprietary foods and condensed milk produce more scurvy than all other methods of feeding. So-called acute rickets is in most cases rickets complicated with scurvy. Children with scurvy commonly present the following symptoms: anemia, intense pain on motion, spongy and bleeding gums, swelling of the legs. There may be purpura, ecchymoses, discharge of blood from the body cavities or pseudoparalysis. The disease may be confounded with rheumatism, stomatitis, rickets, sarcoma, osteitis and infantile paralysis. Fresh milk, beef juice and orance juice are the most effective remedies. In marasmus or infantile atrophy extreme wasting of all the muscular tissues takes place without, as far as we are able to make out, any disease of other organs. It may be dependent on grave intestinal disturbances of toxic or organic origin; the mucous and submucous tissues of the intestines show atrophic changes. The symptoms are: emaciation, lessened appetite, weak pulse, vomiting. In the ordinary cases a proper diet is soon followed by rapid improvement. Rotch found the most suitable milk one with low percentage of fat, high sugar and medium proteids, with increase of the fat as the infant gains in weight. A fair commencing formula would be fat 0.45, sugar 6.00 proteids 1.00, limewater 5.00.

Endocarditis Following Diphtheria.—It is not unusual for cardiac murmurs and an increase of heart dulness to appear in the course of diphtheria, the cause being weakened heart muscle, dilatation and relative insufficiency. In time the muscle recovers and the dilatation and insufficiency disappear. Hibbard detected a systolic murmur in 85 out of 1,052 cases of diphtheria, about 8 per cent. But endocarditis with a valvular lesion is certainly rare. In 220 post mortems of Councilman, Mallory and Pearce, seven cases of endocarditis were found, and in one a pure culture of the Klebs-Loeffler bacillus was obtained from mitral vegetations. Wright and also Howard have reported cases in which the bacillus was found in the endocardium. H. D. JUMP (Pediatrics, Aug., 1903) reports diphtheria in a girl of six years, accompanied by weak and irregular heart. On the seventeenth day she developed fever and a pulse of 120, with a soft systolic murmur at the apex and a sharp second pulmonic. The fever lasted three days and each day the murmur became harsher and louder. A year later at the apex there is a systolic thrill and a loud, harsh, high-pitched systolic murmur. Evidently this was a true endocarditis and not simple dilatation, and its relation to the attack of diphtheria leaves little doubt as to its cause.

HISTOLOGY, PATHOLOGY AND BACTERIOLOGY.

Biology of the Dysentery Bacillus.—D. DOMBROWSKY (Arch. f. Hyg., Vol. 47, No. 3) finds that an amphoteric reaction is most suited for the growth of the dysentery bacillus. There is a remarkable power of adaptability, however, not seen with other pathogenic germs, such as the vibrio of cholera or the typhoid bacillus, and it is very well possible to get an abundant growth with a distinctly alkaline medium. When dried on cover-glasses, the dysentery bacillus will remain alive for from eleven to twenty-three days, depending on the temperature; there was no difference in this respect between cultures forty-eight or seventy-two hours old. In sterilized water, they retained their power of reproducing up to eleven weeks, on bread-crumbs five days and on bread-crust only two days, on potato three days. Skimmed milk proved to be a more suitable medium than ordinary milk. Probably the Shiga and Kruse bacillus are identical.

Hereditary Cystin Diathesis.—At the autopsy performed by Prof. Kaufmann of Basle on a 21½-months-old child that had died of gradual inanition, there were found, according to E. ABDERHALDEN (Hoppe-Seyler's Zeitschrift, June 19, 1903) on macroscopic examination of the internal organs, numerous white points which on microscopic investigation appeared as masses of partly round, partly angular plates, which were recognized as cystin crystals. This case was demonstrated by Kaufmann as the first in which an infiltration of the internal organs with cystin has been recognized. This substance was extracted from the tissues by means of ammonium sulphate from which it was isolated in the form of beautiful six-sided crystals. This was actually a case of deposition of cystin in the tissues. Of interest is the fact that in the same family two other children had already died under similar circumstances, one at the age of 9½ months the other at the age of seventeen months. Two male children survived who gave evidence, as examination of the urine testified, of the same metabolic anomaly as the first case cited. On investigation of the urine of the living antecedents of the children, the following results were obtained: Cystinuria was present in the father but not in the mother, and in the grandfather but not in the grandmother on the paternal side. The results of the autopsy on the case cited indicated that the cystin is very probably formed, not in the intestine, but in the tissues, as the result of a quite specific anomaly of the catabolism of proteid. This was confirmed by the following experiment: After all the free cystin had been removed from the spleen, the latter was boiled in fuming hydrochloric acid for six hours. Upon cooling the resulting solution was precipitated by means of caustic soda and allowed to stand for twelve hours. The residue after filtration was dissolved in 10 per cent. ammonium sulphate and precipitated with glacial acetic acid. The precipitate consisted of the characteristic six-sided crystals of cystin. Of greatest interest is the discovery of the progressive family transmission of this anomaly of metabolism. In the case cited the antecedents, both in the male and female side, were tuberculous.

Destruction of Bacteria in Vaccine Pulp.—The fact that minute quantities of potassium cyanide added to sea water prevented the growth of bacteria and permitted the delicate eggs of the sea urchin to develop, as shown by the experiments of Loeb, prompted H. R. GAYLORD and D. E. WHEELER (Am. Med., Aug. 29, 1903) to employ it for the purpose of destroying the bacteria in vaccine without injuring the essential organism, which is believed to be a protozoan. They allowed fresh vaccine to become contaminated with putrefactive organisms, and then treated it with varying strengths of potassium cyanide, from n/2000 to n/200. A number of children were vaccinated with this pulp. It was found that a solution of n/200 exerts a complete bactericidal action upon the vaccine without in any way affecting the specific organism. As the cyanide evaporates very rapidly, no toxic effects are possible, especially if the solution be placed in a vacuum pan at 36° C. These experiments also suggest that the organism of vaccine is of the nature of animal protoplasm, and is probably a protozoan.

Pathology of Smallpox.—Some interesting contributions to this subject have been made from a series

of five autopsies performed by W. R. STOKES (Bull. Johns Hopkins Hosp., Aug., 1903). Sections and cultures were also made from six non-fatal cases. He believes that the early skin lesions indicate that the primary infection takes place in the lungs, probably by inhalation. The poison when it enters the circulation, shows a selective influence on the epithelium of the skin and respiratory tract, and many cases are probably not further affected. The serious and fatal lesions are caused by the secondary infection from these, and the infectious agent is usually the *Streptococcus pyogenes*. This organism is so distributed through the lesions as to explain most of the visceral changes, such as thrombosis, local necrosis, and the various pulmonary changes. This streptococcus septicemia is the most striking feature of fatal smallpox, and if it were possible to overcome this condition by a special serum, the mortality from the disease would be greatly reduced.

Accessory Pancreas.—Seven cases of accessory pancreas were found among a large number of autopsies by C. THOREL (Virchow's Arch., Vol. 173, No. 2). The most usual site is the wall of the stomach and intestine and more rarely the mesentery. The oval, glandular body generally occupies the submucous layer, occasionally the muscular, and causes both an internal and external prominence. Histologically the structure resembles that of the main organ except that the cells are smaller, the lobulation less perfect, the ducts prominent at the expense of the parenchyma and the cells of Langerhans less abundant or absent altogether. Occasionally myomatous new-formation is observed. It is difficult to explain the presence of pancreatic tissue at such abnormal sites, but probably some of the embryonal cells destined to become pancreas were cut off from the rest and displaced by some unknown factor.

Melakoplakia of the Bladder.—This name has been applied to a very peculiar and hitherto undescribed condition of the bladder observed by v. HANSEMANN (Virchow's Arch., Vol. 173, No. 2). Studded over the mucous membrane there were a number of round or oval, yellowish prominences, in part ulcerated, in part surrounded by an inflammatory zone. Microscopically they consisted of aggregations of large cells, with peculiar inclusions, which gave the iron reaction. The cells did not seem to come from any of the elements of the surrounding tissues, nor were they looked upon as parasitic by a well-known authority, so that their origin and significance is not clear. The patients did not suffer from any urinary symptoms and had died of some other cause.

Toxin and Antitoxin.—The Ehrlich theory of immunity is becoming more and more popular, but an interesting article of M. GRUBER and C. F. v. PIRQUET (Münch. med. Woch., July 14 and 21, 1903) shows that it is really based upon faulty conclusions. There is no experimental proof that a multiplicity of poisons exists with each disease, of qualitatively similar action, but varying toxicity and affinity toward the antitoxin, such as Ehrlich assumed when he formulated his theory of a "poison spectrum." Likewise there is no reason to assume that toxins act differently than other organic poisons. The conversion of a toxin into a non-poisonous "toxoid" with undiminished affinity for the antitoxin is possible, but not strictly proven. Toxin and antitoxin have weak chemical affinities toward each other and in combining they follow the law of other chemical compounds of weak attraction. It is possible that occasionally molecular compounds of varying proportions are also formed. The long period of incubation and other phenomena are best explained on this hypothesis. The formation of antitoxin has nothing to do with toxicity and cell-immunity for (*a*) many innocuous substances can lead to the production of antitoxin; (*b*) animals not susceptible to certain toxins, will yet manufacture antitoxins; (*c*) despite the presence of a large amount of antitoxin, the susceptibility to a poison may still persist and even increase; (*d*) cell immunity can be acquired without antitoxin formation; (*e*) the antibodies are not formed in those organs where the toxin is most active. The specific antibodies are not normal constituents of the body; their production occurs only after the introduction of foreign matter and has the character of an internal secretion. It is due to unknown peculiarities in the molecular structure of this foreign matter. The non-poisonous toxin-antitoxin compound does not lead to the formation of more antitoxin, it is chemically of an entirely different structure than its two constituents.

OBSTETRICS AND GYNECOLOGY.

Chronic Inversion of the Uterus.—The problem of successful reposition of an inverted uterus is almost entirely one of mechanics. According to REUBEN PETERSON (Am. Gyn., June, 1903), treatment must be directed toward increasing the diameter of the inversion ring, either by pressure exerted from within outward or through incision of the pillars of the ring. The following operation is advocated by the author as meeting the requirements of the condition: The inverted fundus is grasped with a volsella and pulled forcibly outward and downward. Another volsella catches the anterior vaginal mucosa in the median line just above the anterior lip of the cup and pulls it sharply upward. Through the vaginal mucosa thus rendered tense is made a transverse incision some 2½ inches in length. In order to avoid opening the bladder, this incision is made as close to the cervix as possible. The vesico-uterine pouch is opened, the cervix exposed and divided between two volsella. This incision is carried upward in the anterior median line of the uterus within one-third of an inch of the fundus. The inversion is now reduced easily, the fundus going upward and each half of the divided cervix being carried through half the arc of a circle and finally meeting so that the two halves form a complete cervix situated downward, not upward. A wedge-shape piece of the bulging uterine wall on either side of the incision is removed, as is suggested by Taylor. This is done to enable the retracted peritoneal edges to come together. The uterine incision is now closed by continuous catgut sutures. The needle was passed from the peritoneal surface down to, but not through, the uterine mucosa. A catgut suture is passed around each round ligament close to the uterus and each end passed through the anterior vaginal wall and tied after the fundus is returned into the pelvic cavity. This brings the line of incision in the anterior uterine wall up against the bladder peritoneum, at the same time giving support to the fundus, which has long been prolapsed. The various vaginal operations which have been advocated for the same condition the author divides into four groups: (1) Partial posterior colpohysterotomy (Küstners' operation), which gave four successes in six operations (Küstner), Perlis (Von Jordon) and two failures (Salin Weber); (2) complete posterior colpohysterotomy (Piccoli's operation); (3) partial anterior colpohysterotomy (Kehrer's); (4) complete anterior colpohysterotomy (Spinelli). The vaginal methods collectively show 26 cases, with only three failures and no deaths, or 88 per cent. successful.

Tumors of the Round Ligament.—These neoplasms are comparatively rare, or else operators have been very derelict in reporting them, says D. G. LEWIS (Am. Jour. of Obst., August, 1903). Here, as elsewhere, little is known of the etiology of these growths. Menstrua-

tion provokes a temporary increase in the volume of the neoplasm. We have nothing to make us agree with Sänger that the traction of the displaced uterus may play a causative rôle. To trauma we are not justified in ascribing a causative action. Some of the tumors are situated directly over the external orifice of the external inguinal canal, others at the upper extremity of the labium majus, while some are found where one finds no trace of normal round ligament tissue, *e.g.*, about and below the labium majus. In rare cases the tumors are elongated, cylindrical, taking the form of the little finger. Usually they are single, though they may be multiple. The macroscopical appearance varies according to the histologic nature of the growth. The fibromyoma of the round ligament are like those of the uterus, susceptible of undergoing varied degenerations, benign and malignant. The lipomata present themselves under two forms: (1) When the tumor is developed in the continuity of the round ligament with normal elements of the ligament running through it; (2) when the growth is developed at the expense of the fatty mass of the labium majus. The tumor, usually painless, becomes at the monthly periods the seat of a very sharp pain, which radiates into the corresponding lower extremity, the lumbar region and the pelvis. At this time palpation become painful, and the neoplasm also shows a transitory increase in its volume. In the interval between the periods the tumor is generally painless; sometimes, however, without appreciable cause, little by little, it becomes distinctly painful. To the permanent or periodic suffering we must add the distress, more or less considerable, from walking, in cases where the tumor occupies the labium majus. A tumor of the extra-abdominal portion of the round ligament is differentiated from: (1) an ordinary reducible inguinal hernia of bowel or omentum, or both by the absence of reducibility, impulse on cough and tympany on percussion; (2) from an incarcerated adherent, or irreducible hernia, by absence of impulse on coughing, history of reduction on previous occasions, *e.g.*, before reduction had become impossible, absence of any history of nausea or vomiting; (3) from strangulated hernia, by absence of the above signs, and the grave symptoms incident to all bowel strangulation, shock, increased pulse rate, nausea and vomiting. The prognosis depends upon the histologic structure of the neoplasm. The only treatment applicable to these tumors is extirpation, and this should be done early or as soon as the tumor is recognized. Some operators, after having ligated the round ligament, have simply abandoned it in its place; others have fixed the ligament to the wall of the canal.

The Present Position of Hysterectomy for Fibroids.—What has a woman to gain in this operation? says SKEWEKEITH (Am. Gyn., June, 1903). In some cases, nothing at all; in very many, very little indeed. In some a life of comfort and happiness, as against a life of misery; in a few, life inself. In an advanced case of ovarian disease, be the local difficulties what they may, one can honestly encourage a woman to run any amount of risk. She has not much to lose—a few months only, it may be, of everlasting suffering—and she may gain much by an operation, having much to gain. It is quite different in the case of nineteen-twentieths of those who have a simple fibroid tumor. The lists of operations are very unsatisfactory, as there is no standard to go by, and descriptions are so often recklessly indiscrete, incorrect and careless; for example, we find a tumor described as "large," or "the largest I have ever seen." The real reduction in the death-rate has taken place and has been brought about by discarding the clamps, the extraperitoneal operation, and the adoption of the intraperitoneal treatment of the neck of the uterus or complete hysterectomy. It is difficulty, nay impossible, to lay down any positive rule for the performance of hysterectomy, for it is very seldom that it is absolutely necessary to resort to this operation to save life; whereas one must always advise the removal of an ovarian tumor. In the following cases, however, one may say that hysterectomy ought to be the rule: In all fibrocysts, in all edematous tumors when accompanied by profuse watery discharge, in all large tumors causing symptoms, and when a patient is under fifty years of age. Even when a patient is over thirty years it may be worth while to remove a tumor weighing 30 or 40 pounds. In small tumors extending as high as the umbilicus or so, fibrocysts and edematous tumors excepted, the writer, as a rule, advises Apostoli's treatment. This form of treatment does not seem to have been very successful with some. Nor is this to be wondered at if the accounts received from patients treated by others are in any way correct, for it has seemed to resemble Dr. Apostoli's treatment simply in that a battery was used.

Vaginal Incision in Sepsis Following Abortion.—The following alarming statements are made by HUNTER ROBB (Am. Gyn., June, 1903), to the effect that (1) of all married women who die between the ages of twenty and thirty nearly 10 per cent. succumb to a puerperal infection; (2) at the present day, in private practice, at least, the mortality from childbed fever is nearly as high as it was forty years ago. Such a confession is astounding and humiliating, and we must of necessity come to the conclusion that the advantages of aseptic and antiseptic procedures are either chimerical or that the belief in them is still to a large extent more theoretical than practical. So far as the author's own experience goes, the remote results of a septic process following labor or an abortion, implicate more particularly the fallopian tubes and ovaries in 40 to 60 per cent. of the cases. As a rule the infection begins in or near the external genitals. And, provided it is of a virulent nature, it implicates successively the structures of the vagina, the cervix, the uterus and the fallopian tubes, and thus extends to the peritoneal cavity. At other times it reaches the peritoneum through the uterine walls by way of the lymphatics or blood-vessels. Accompanying the inflammation there is often an exudate, which may accumulate in the peritoneal cavity or may remain sealed up in the fallopian tubes. The exudate may be of any form or mixture of forms. If absorption of the exudate does not occur, organization takes place, with the formation of adhesions, which bind down the tubes and ovaries more or less firmly, and thus interfere with their functions. In this way various symptoms are produced which cause the patient a greater or less amount of inconvenience until the adhesions are separated. Under such circumstances we have two problems to solve: (1) How can we insure to the patient the best chance for her life? and (2) How can we, at the same time, prevent the occurrence of unfortunate sequelæ? The author advises the following method of dealing with an infection after an abortion: The cavity of the uterus is first cleaned out to prevent the continued absorption of toxins from any infectious material which may be present, and thus, at least, limit the intensity of the process. For this the finger alone is employed, or combined with the curette. The cavity of the uterus is washed out with hot saline and two ounces of peroxide of hydrogen; it is then cleansed with saline solution and sponged dry. After this two or three drams of iodoform powder are placed into the uterine cavity, which is then packed with sterile gauze. Now the cul-de-sac is freely opened, and after evacuating any fluid

which may be present, it is irrigated with hot saline, followed by two ounces of peroxide of hydrogen. This in turn is washed out and the cavity wiped dry. Lastly, two or three drams of sterilized iodoform powder are dusted into the cul-de-sac, after which it is packed tightly with strips of sterile gauze. By this procedure the author believes that two advantages are obtained: (1) By evacuating the fluid from the cul-de-sac further absorption is prevented; (2) the ovaries and fallopian tubes are saved by preventing adhesions which would almost invariably form as a result of the organization of the exudate. The author's experience has shown that the secretions from the uterine cavity are almost always sterile, while organisms are invariably found in the exudate in the cul-de-sac.

Peritoneal Adhesions.—The relation between peritoneal adhesions and the functionating uterus is the subject of a most interesting paper by CHAS. B. REED (Am. Jour. of Obstet., August, 1903). Inasmuch as 80 per cent. (Winckel) of the female bodies which come to the post-mortem table show the effects of peritoneal inflammation in some form, it seems remarkable that cases of function disturbances of the uterus are not more frequently reported. Many factors combine to place the uterus and its vicinity first in point of susceptibility to inflammatory adhesions. Its varied functional activity, its rapid change of form, size, position and consistency—its proximity to organs containing infectious material and the open communication which is afforded by the tubes with the pelvic cavity, and vagina with its manifold possibilities for infection, all unite to produce a predilection for adhesions, which some authors claim as high as 75 per cent. It is a relatively common occurrence to find adhesions between the rectum and uterus and ovaries, which locally produce changes in the peristalsis and nutrition of the rectum, such as catarrh, diarrhea, stricture, coprostasis, and even paralysis, ileus and death. In addition to the general symptoms, there is also to be found locally that all the activities of the uterus are more or less impaired by interfering conditions. It is very noticeable, however, that the functional disturbance is in no way proportionate to the extent of the peritonitic changes, but rather to the anatomical location of the adhesions. The menstrual function may be primarily, seriously involved. Thus a persistent and violent dysmenorrhea is to be found in many cases, where the uterus is bound to the intestine, appendix, omentum or abdominal wall. To substantiate the effect of adhesions as an agent in the cause of sterility, we must appeal largely to theoretical considerations. One etiological factor would certainly be the existence of dyspareunia in the presence of adhesions and inflammatory residues. Adhesions may play an important rôle in the determination of a tubal pregnancy by the construction of the lumen, as in the historical case of the wandering of the ovum, reported by Weber von Ebenhoff, where the right tube was obliterated; the corpus luteum was found in the left ovary, and the fertilized ovum in the end of the right tube. The presence of adhesions undoubtedly produces many abortions and influences a certain percentage of fetal and placental anomalies. It is well recognized that sterility and tubal pregnancy may result from such conditions, and it is also probable that pregnancy and labor are rendered pathological by the presence of adhesions far oftener than the literature would indicate. Many adhesions are undoubtedly destroyed by the growth of the uterus in pregnancy, but the rupture of the same may be attended with fatal hemorrhage. Adhesions between the uterus and movable organs of the abdomen are only rarely a source of danger or a cause of death.

THERAPEUTICS.

Alcohol Compresses.—This method of treating local inflammatory processes, first advocated by Salzwedel, has been modified by BESCHORREN (Deut. med. Woch., 1903, No. 28), in order to avoid the smarting caused by the application. To the alcohol he adds an equal amount of a one-per-cent. solution of aluminum acetate, which raises the temperature of the fluid several degrees and makes it more soothing. The moistened gauze is applied directly over the inflamed area and a piece of rubber tissue, with more gauze over this. A perforated impermeable bandage is then wound around the parts.

Adrenalin in Typhoid Hemorrhage.—A severe case of typhoid hemorrhage, occurring in the practice of B. GRAESER (Münch. med. Woch., July 28, 1903) was virtually saved by the prompt use of adrenalin. Thirty drops of the commercial solution were given every three hours in physiological salt solution. No ill effects were observed. Although it is improper to judge from one case, the patient had been bleeding steadily with all the other drugs.

Toxic Symptoms Following the Use of Aspirin.—Some very strange toxic symptoms were noticed by FRANKE (Münch. med. Woch., July 28, 1903) after the ingestion of one gram of aspirin. In fifteeen minutes the upper lip began to swell and deglutition became painful, while pulse and respiration was very much increased. The swelling soon extended over the entire head and was not relieved by cold applications. Somewhat later an extremely troublesome urticaria made its appearance over the entire body. The following day all the symptoms had disappeared, and with them the attack of influenza, for which the aspirin had been given. Probably the condition was one of phenol poisoning from splitting up of the drug in the stomach, since the urine contained large amounts of phenol.

Albuminuria in Aortic Insufficiency.—Albuminuria is a common condition in chronic endocarditis as soon as there is a disturbance of compensation, which brings with it venous stasis. At first this will disappear with digitalis, but later, when anatomical changes have taken place in the kidneys, no drug will be of much avail. This change of simple congestion to cyanotic induration manifests itself clinically in increased excretion of urine containing albumin, fatty renal epithelium and granular cylinders, while the other symptoms of stasis are relieved or disappear with treatment. V. LEUBE (Münch. med. Woch., July 28, 1903) classifies the possible causes of an albuminuria as follows: (1) A complicating parenchymatous nephritis may exist, as where the endocarditis is caused by diphtheria. The nephritis is generally amenable to treatment, while endocarditis persists. (2) There may be a general atheroma which also involves the renal vessels, leading to arteriosclerotic kidney. This is especially common with aortic insufficiency. (3) When the energy of the heart sinks and the cardiac muscle undergoes fatty degeneration, stasis, followed by cyanotic induration, is found in all the organs. This occurs only in the later stages of aortic insufficiency. Besides this there is, however, another form of albuminuria, characteristic for the early stages of aortic insufficiency and not accompanied by cyanosis, edema, etc. The urine is not diminished in amount, the specific gravity is relatively low, and the amount of albumin, hyaline and granular casts very slight. Pathological examination of a few kidneys of this kind show that the marked variations in pressure are responsible for certain anatomical changes. The walls of the arteries and capillaries are found much thickened, so that the amount of blood carried to the kidneys must necessarily be less than normal. The liver and spleen show similar lesions, but never the lungs.

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GALL-STONES.

WE have had occasion to comment on the truly memorable meeting of the Association of American Physicians, held in Washington last spring, noting particularly the illuminating discussion on diseases of the gall passages and their treatment. One of the most notable papers read at that discussion was that of Dr. C. A. Herter, on the Etiology and Chemical Pathology of Gall-Stones, which is concluded in this week's issue of the MEDICAL NEWS.

While Dr. Herter makes it very evident that there are a large number of unsettled points essential to the full understanding of the many intricate questions relative to this problem, he at the same time gives us an illuminating résumé of the solid grounds for reasonable deductions, and a noteworthy series of suggestions as to the most fertile fields for future investigations.

That all gall-stones are not alike is very manifest, and that pathology in future must differentiate between the modes of formation of cholesterin stones and bilirubincalcium concretions is imperative. Moreover, a careful study of this paper will tend to show that the problems are not as easy of solution as our text-books have led us to believe.

Stagnation of the bile—bilious diathesis, torpid liver, and similar delusive terms receive somewhat of a setback as we read that mere concentration of the cystic contents has probably little to do with the production of gall-stones, of either variety, and that retardation of the flow of the biliary secretion probably must be associated with other factors, notably cystic infection, in order that the train of circumstances leading up to calculous formation may become operative.

The antiseptic qualities of the bile, so dearly loved by those of a teleological cast of mind, are probably non-existent, and interference with the free flow of the liver secretion seems to offer just the opportunity for the ubiquitous bacterium.

Dr. Herter tells us further that there is a tendency, perhaps, to exclude from the mind other than the bacteriological features concerned in the formation of gall-stones, now that in recent years so much important verifiable research has been conducted along the line of cystic infection. While it may be true that infections from a number of organisms may play very large, maybe the most important rôles, metabolic factors should not be lost sight of. His suggestions relative to the problems of excessive fat diet we believe are of far-reaching importance and promise much for the investigator.

Summing up, he says: "It is plain from what has been said that there is at present no unequivocal evidence that gall-stones arise from constitutional derangements unconnected with microorganic invasions of the gall-bladder. On the other hand it is certain that the cholesterin of the bile can be considerably increased by local irritants unconnected with infection and it is likely that the requisite local conditions for such increase sometimes arise through purely metabolic disorders. While gall-stones are commonly the result of local infections we should carefully guard against the conclusion that they can never have a diathetic origin. It is at least highly probable that diathetic conditions are capable of so altering the composition of the bile as to materially favor the production of calculi in the presence of suitable local bacterial activities."

We trust that Dr. Herter may be permitted to continue his studies along this line, feeling that his work on therapeutics will open up a new vista in the purely medical treatment of gall-stones.

THE WIDENING ROLE OF INFECTION.

THERE are not a few medical men who have been thoroughly persuaded for some time that the applications of bacteriology to medicine were

at an end and that far from further specific microbic disease agents being discovered there would be a reaction that would make bacteriology of much less importance in the science of medicine than has been hitherto supposed. As a matter of fact, however, each succeeding year brings new diseases within the scope of bacteriology and is making it ever clearer that the study of minute life holds the mysteries of disease that have thus far proved so hopelessly puzzling. There are very few general practitioners now who are not distinctly of the opinion that rheumatism is an infectious disease due to a microbic cause even though up to the present time none of the micro-organisms found in tissues affected by the disease have been proven to be the specific cause of rheumatism.

After all, since the demonstration that pneumonia is due to a specific bacterial agent, it is not a matter for surprise to find that other affections, supposedly dependent on variations in temperature, or on dampness and exposure to cold, are really due to the fact that specific microbes find favorable opportunities under such conditions of exposure to obtain that hold upon the tissues which enables them to produce their serious effects. It seems very clear now that the various forms of colds that is, the various catarrhal conditions which so frequently follow exposure to unexpected changes of temperature, will eventually prove to be due to a number of differing forms of bacteria. Each successive winter with its stock of clinical and bacteriological observations apparently brings us nearer to the acceptance of this conclusion.

In another and quite different line, the rôle of infection is becoming equally important. Many skin lesions have proved to be due to bacteria of various kinds, although in the beginning of bacteriological work in dermatology there seemed to be very little hope that specific causes for cutaneous diseases would be found. The fact that individual reaction is so important in cutaneous disease seemed to point to the conclusion that not specific causes but altering natural conditions were the etiological agents. At the present time, however, the importance of bacteriology in this department of medicine is very generally recognized. In the familiar disease baldness, Sabouraud's observations seem to show the almost constant presence of a specific microbe in all cases of ordinary premature baldness. Even the remote conclusions that flow as corollaries from Sabouraud's teaching present little difficulty to many minds. Not only the infectiousness of baldness, but its possible contagiousness is urged by many.

With these extensions of the doctrine of the bacterial origin of still further diseases in mind, it is not surprising to find that in the nervous system, too, the rôle of the bacteria is coming to be recognized as an important etiological element in the production of disease. Such a condition as myelitis is frankly conceded as secondary in most cases to some infective process in other organs. Even an ordinary furuncle may under unfortunate circumstances prove a source of infectious material that by its ravages in the central nervous system may prove fatal or leave the patient a hopeless paralytic. Supposedly functional nervous diseases are yielding to the same etiological explanation and so it is not a matter for surprise to find that in the discussion of chorea at the recent meeting of the British Medical Association many good authorities did not hesitate to express the opinion that it is an infectious disease, very probably due to a specific bacterium. There are even investigators who consider that they have isolated the bacterium in question. As there is a manifest relationship between rheumatism and chorea this conclusion in the light of recent alterations of opinion with regard to rheumatism might almost have been expected. It is evident that there is still a rich field open for bacteriological investigators and discoveries of importance lie only just behind the veil.

ECHOES AND NEWS.

NEW YORK.

Hospital Cornerstone Laid.—The cornerstone of the new building for St. Mary's Hospital in Jamaica was laid last week by the Very Rev. Mgr. McNamara, Vicar General of the Diocese of Brooklyn. The hospital building when completed will accommodate about 300 patients. The institution, which now has rather cramped quarters, is conducted by the Little Sisters of the Order of St. Dominic.

Trachoma Campaign.—Dr. Lederle has caused a circular letter to be mailed to the board of directors of every hospital and dispensary in the city, asking the cooperation of each institution in the efforts to stamp out trachoma in the public schools. Dr. Lederle proposes to apportion the school children needing treatment in the various districts among the several dispensaries, the pupils being claimed as patients of the dispensaries nearest their homes. He asks that careful record be kept of each child's attendance for treatment, in order that the Health Board inspectors may keep the children under close surveillance. Dr. Lederle's three most important requests are: To permit this Department to print the name and address of your institution on the back of cards given to children excluded from school, in order that those living in your neighborhood may attend your institution for treatment. To

request the surgeon in charge of your eye department to stamp the date of each visit made by a school child on the back of the card given to the child by the inspector for this purpose, in order that the inspectors may be assured that treatment is being regularly attended to. Date stamps will be furnished by this Department on application. To refer cases requiring operation, if you so desire, to the hospital organized for this purpose by the Department of Health. Upon a chart in the office of the President of the Health Board is marked with colored pins the location of all the dispensaries and public schools. Close watch will be kept upon reports for results of the new scheme, and, if this fails, other and more vigorous means for treating school children for the eye disease will be put into operation.

The Health Board and the New Regime.—The conditions which existed under Col. Mike Murphy and John B. Sexton, the Tammany Commissioners of Health, are compared with the new order of things under Ernst J. Lederle, the present Commissioner, in a pamphlet issued last week by the Citizens Union. Smallpox reached the high-water mark in the autumn of 1901, under Tammany, but as a result of 810,280 vaccinations in 1902, only 44 cases have been reported this year and but 3 deaths. A decrease in the number of deaths from consumption is also credited to Fusion. The document says: Out of 70,720 deaths in Greater New York in 1901, 8,135 were due to consumption. No strong measures were being taken to stamp out the disease. In 1900 the deaths had numbered 8,154. Under Dr. Lederle in 1902 the deaths were reduced to 7,569, a death rate of only 2.03, against 2.30 in 1901 and 2.37 in 1900. The Department is now planning, in cooperation with the Board of Trustees of Bellevue and allied hospitals, a municipal sanitarium outside the city, to cost $500,000 and to be under the charge of the trustees of Bellevue and allied hospitals. Although the plan has not yet come formally before him, it is understood that the Mayor will sanction it. A dispensary for tuberculosis treatment is now building next door to Department headquarters. The article says that people who came off North Brother Island during Tammany control declared that it was worse than the Black Hole of Calcutta. It adds: It has been evident for years that North Brother Island has been a name to be dreaded by the poor of this city. The rich who were attacked by contagious disease could be properly isolated and treated at their homes, but the poor people were carted off to North Brother Island and there, according to popular tradition, ill treated, half starved, and neglected. This tradition had the result of teaching the poor to conceal the presence of contagious disease among them rather than run the risk of having members of their families taken away to the island. Since January 1, 1902, the Department has spared no effort to eradicate this belief. This has been done, first, by putting the medical corps and superintendence of Riverside Hospital into competent hands, so that patients should have the best of medical attention, food, and general treatment. To add to the comfort of patients, a telephone system was installed in all the pavilions, so that friends of patients might have communication with them at all times in case of necessity, or when it was felt that messages from home might help the progress of the patient toward recovery. Visiting days were also established for the friends of patients, and the means of communication with the island were improved, so that there should be no reason why, within the limits of safety from contagion, North Brother Island should not be as freely visited as any other city institution. All this appears to have had a good effect, for patients have gone back to their friends and told them that the commonly expressed fears regarding the treatment there prove now to be baseless. The concealment of contagious cases has now almost entirely ceased. A death rate of 18.75 in 1902 was a saving of 4,500 lives, the report says. For 1903 the death rate is likely to be 18.

Memorial Hospital Sold.—The Memorial Hospital for Women and Children, Classon and St. Mark's avenues, Brooklyn, was sold under foreclosure proceedings in the Brooklyn Real Estate Exchange last Tuesday. The Dime Savings Bank had a mortgage of $50,000 on the property under date of June 7, 1895. The hospital authorities were unable to pay the interest, which was in arrears for several years. There are several other claims against the corporation. Clifford S. Kelsey, who, it is understood, acts for the Jewish Hospital Society, of which Abraham Abraham, of Abraham & Straus, is president, bid it in for $96,500. Mrs. Jennie V. H. Baker, chief of the medical staff of the Memorial Hospital, said that the property had been purchased by the Jewish Hospital Society.

PHILADELPHIA.

Under Water Five Minutes.—To settle a dispute, George Kistler, swimming instructor at the University of Pennsylvania, recently remained under water five minutes and five seconds. It is stated that an examination by a physician following the feat showed no departure from the normal except some acceleration of the heart's action.

State Homeopathic Medical Society.—The Thirty-ninth annual meeting of the Homeopathic Medical Society of the State of Pennsylvania was held at Scranton September 22, 23 and 24. The program included a wide range of topics which were discussed by the leading homeopathists of the State. The meeting was held under the presidency of Dr. O. S. Haines, of Philadelphia.

Columbia's New Hospital.—The new hospital at Columbia, Pennsylvania, built and equipped at the cost of $40,000, has recently been formally occupied. The building is of Columbia brick ornamented with Indiana limestone. It is three stories high with a frontage of 88 feet. It consists of a main central portion with a wing on either side and an annex in the rear of the central building. The citizens of Marietta contributed $1,000 toward the erection of the building, in recognition of which a portion of each public ward has been named the "Marietta Section."

Jewish Hospital Improvements.—Three new buildings, which have recently been added to the Jewish Hospital, are to be dedicated on October 4. They are the Guggenheim Hospital for private patients, the Eisner home for nurses, and the Loeb operating building. The first of these will accommodate 40 patients. The nurses home is a three-story building with accommodations for 35 to 40 nurses. The Loeb building contains an operating room 16 by 24 by 15 feet in size.

Vaccine Physicians will Examine Pupils' Arms.—The Board of Education has granted authority to the vaccine physicians of the city to visit the public schools and examine the arms of the pupils to determine if they possess good vaccination marks. Under the instructions issued, the vaccine physicians are not permitted to vaccinate any of the

children in the schools. When it is found that revaccination is necessary, the pupils are directed to so inform their parents, and will not be permitted to return until the operation has been performed, and been successful.

Typhoid Fever Traced to Milk Supply.—Infected milk and defective sanitary conditions and not an impure water supply are shown by Chief Abbott, of the Bureau of Health, to be the cause of the numerous cases of typhoid fever reported during the past few weeks from the Twenty-first Ward, where only filtered water is furnished. Dr. Abbott in his report says that the conclusion reached is, in brief, that the unusual number of cases of typhoid fever in the Twenty-first Ward is not due to the water supply, else there should be a corresponding increase in the Twenty-second Ward, receiving essentially the same supply. This is not the case. All the accumulated evidence points to the accidental infection of two milk supplies as the probable cause of the sudden outbreak and, finally, that unless certain defective sanitary conditions now existing in the ward be corrected, we may look for a repetition of this accident in spite of the fact that the population of those two wards is receiving a water supply of the very best grade. The official records of the bacteriological analysis of these waters made at brief intervals during the last six weeks or more point to nothing that would suggest the water in any way at fault. The investigation of the milk supply showed that of the 78 cases of typhoid fever in the Twenty-first Ward occurring since August 1, 41, or approximately 53 per cent., were found to have purchased their milk from a single dealer. Two cases of typhoid fever are known to have developed in this household. As milk is one of the best vehicles for the conveyance of typhoid fever infection, it seems fair to suspect that the disease in the ward in question is due to the use of milk that was in one case accidentally infected by the dealer in whose family the disease existed. As to the general sanitary condition of the neighborhood, Dr. Abbott says, that a "careful survey of the neighborhood reveals the fact that many of the properties have no connection with the street sewers, their facilities for drainage and disposal of waste being over the surface and into the cesspools located in the back yards. There is conspicuous lack of sewage facilities in the Twenty-first Ward. A number of streets have no sewers under them and a very large number of houses located in many instances on streets having sewers are not connected. With the continuation of a condition of this kind, it is obvious that we must anticipate from time to time such epidemics as the one now engaging our attention.

Phipps Institute.—The Henry Phipps Institute for the Study, Treatment and Prevention of Tuberculosis has arranged for the coming fall and winter a series of lectures by well-known physicians on the various phases of tuberculosis. Some of these lectures will be more or less popular in character and all will be free to the public. The Auditorium of the Witherspoon Hall at Juniper and Walnut streets, Philadelphia, has been selected for the purpose, having a seating capacity for nearly 1,200 people. The first of these lectures will be given by Dr. E. L. Trudeau, of Saranac Lake, N. Y., during the last week in October, his subject being "The History of the Development of the Tuberculosis Work at Saranac Lake." The following gentlemen have been invited to give the subsequent lectures: Dr. Pannwitz, of Germany, in November; Dr. William Osler, of Baltimore, in December; Dr. Calmette, Director of the Pasteur Institute, at Lille, France, in January; Dr. Herman M. Biggs, of New York, in February, and Dr. Maragliano, of Italy, in March. All of them have accepted with the exception of Dr. Calmette, who will come, if it is possible for him to leave his work in connection with his Institute, and the International Congress on Tuberculosis, to be held in Paris in 1904. Subjects and exact dates will be announced as soon as possible. The Director and members of the staff of the Henry Phipps Institute extend a most cordial invitation to the profession in general to attend these lectures. It is greatly desired that this inaugural series of lectures will prove a success and be largely attended.

The following additions to the staff of the Henry Phipps Institute have been made: Dr. M. P. Ravenel has been appointed Assistant Medical Director and Chief of the Laboratory; Dr. E. A. Shumway has been appointed Ophthalmologist, and Dr. J. F. Wallis has been appointed Dermatologist.

CHICAGO.

Superintendent of Compulsory Education Censured by Health Department.—The Health Department characterized the recent attempt of the Superintendent of Compulsory Education to operate a special health department, as "meddlesome, mischievous and sensational." Among other things, the Bulletin says: "Physicians of Chicago, school principals and teachers and parents of school children are officially notified that they are not required, either by State law or city ordinance, to report cases of contagious disease, suspected or actual, to any authority except the contagious disease division of the city health department. This public notice was made necessary by a renewal of the efforts of the Superintendent of Compulsory Education of the school board to operate an independent health department of his own. His motive is no doubt a laudable one, and if his efforts were guided by a moderate degree of professional intelligence and qualification for the work, they might be beneficial instead of detrimental."

Physicians Register.—The 1903 "Report on Medical Education" of the Illinois State Board of Health will be issued in about two weeks. This report includes an official register of physicians, corrected to September 14, 1903. Illinois physicians who desire a copy of the report should write to Dr. James A. Egan, secretary of the State Board of Health, Springfield.

Appointment of Dr. Halstead.—Dr. A. E. Halstead has been appointed attending surgeon to St. Luke's Hospital.

University Buys Dental College.—The absorption of the Chicago College of Dental Surgery by the University of Illinois has been consummated. Dr. Truman W. Brophy, the present Dean of the Dental College, will be retained in that capacity. The University has purchased the building and all the college property outright. It is said that 800 students are enrolled in the Dental College for the next term.

Hospital for Contagious and Infectious Diseases.—It is said, upon what appears to be reliable authority, that Rush Medical College has in contemplation the establishment of a hospital for the care of persons suffering with infectious diseases. This is to be one of the benefits, according to the present plan, which will come to Chicago as a result of the money set aside by John D. Rockefeller for the furtherance of the study of this line of medical

science. The need of such an institution is urgent. According to Chief Medical Inspector Heman Spalding of the City Health Department, there is insufficient accommodation for this class of patients, and as a result the infection is far greater than it should be. For years Dr. Spalding has urged the necessity of the establishment of such institutions, but the Council has failed to make appropriations because of the financial condition of the city. In only a few of the hospitals are the milder forms of contagious diseases treated. The Presbyterian Hospital has arrangements for the care of a few and the County Hospital cares for a limited number. Smallpox cases, however, are all cared for at the isolation hospital, but it is the other forms of infectious diseases that give the health department the greatest concern because of the lack of facilities to handle them. Physicians interested in this matter have urged the Rush College and University of Chicago authorities to agree to take the matter up and establish three hospitals for this class of patients, one in each of the divisions of the city where they would be easily accessible.

Dr. Lynch Accepts a Position in the University of Chicago.—Dr. Frank W. Lynch, associate in obstetrics at the Medical School of the Johns Hopkins University and for two years resident obstetrician in the hospital, has resigned to accept a position in the University of Chicago. Dr. Lynch took his collegiate degree at Adelbert College in 1895, and finished his medical education at Johns Hopkins. He graduated in 1899 and it is said that his promotion in university and hospital work since that time has been rapid.

GENERAL.

Library for the Blind.—Under the auspices of the royal oculist Theodor, Duke of Bavaria, a committee has been formed for the purpose of creating a library for the blind in Hombourg.

Prophylaxis of Leprosy in Indo-China.—By a recent edict of the Governor General of Indo-China, lepers are forbidden to appear upon the public streets; and infraction of this law subjects them to arrest and transportation to the hospital for lepers on the island of Cu-lao-Rong.

Oral Hygiene.—The following action of the National Dental Association, at the recent meeting, held at Asheville, N. C., was taken: "Resolved, That it is the sense of the 'National Dental Association' that each Medical College in the United States should include in its curriculum a lectureship on 'Oral Hygiene, Prophylaxis, and Dental Pathology.'" The dental profession feels that with the introduction of the teaching of Oral Hygiene in the Public Schools, which they are striving to accomplish, and the cooperation of medical men who have been specially instructed on this subject, that a great stride will have been made toward the prevention of caries of the teeth, not to mention many other good results to the general system, which would surely follow a better care of the oral cavity.

Diphtheria Antitoxin in London.—By the use of the antitoxin treatment in diphtheria cases, of which there were 6,500 last year in the London hospitals, the death rate from the malady has been reduced in a few years from over 30 to 11 per cent.

Medical Lecture Course.—The directors of the Memphis Medical College have established a lectureship, named in memory of the late William E. Rogers, M.D., founder of that institution. The lectureship was established upon the suggestion of the faculty. Once during each session a lecture will be given by a specialist in some branch of medical science, at the invitation of the faculty. The first lecture will be given about the middle of November by Dr. Charles H. Hughes, of St. Louis.

New Medical School Buildings at Chicago University.—One of the most extensive real estate deals in the history of the city has practically been completed for the University of Chicago. The transactions involve the purchase of the entire south frontage of the Midway Plaisance between Cottage Grove and Madison avenue, at a total consideration estimated at $1,000,000 for the land and $450,000 for the buildings. The news of the extensive purchases confirms the reports which have circulated in university circles for some time that the medical school buildings are to be established on the Midway. Rush Medical College will form the nucleus of the institution, and it will be supplemented by the McCormick Memorial Institute for Infectious Diseases, for which extensive hospitals may be constructed on the "cottage" plan. Possibly the Chicago Polyclinic Hospital may be included also.

Malarial Fever at Santiago.—The unofficial reports current some time ago that yellow fever was prevalent in the vicinity of Santiago has led to special efforts on the part of the Public Health Service to get at the truth in regard to the epidemic in that quarter. The latest official reports received yesterday state that there is no reason for modifying the first diagnosis of the disease. It is malarial fever of a most pernicious character. Its worst extent appears in and around Daiquiri. The public health advices say that in some measure the facts bear out the unofficial statements that have been circulated regarding the disease. Acting Assistant Surgeon Wilson, at Santiago, under date of Sept. 5, describes the malady in detail. It attacks persons who have suffered several attacks of intermittent malarial fever. It is accompanied by vomiting, the body of the patient turns yellow, and cases not treated the first twelve hours are always fatal. The disease is spreading among the natives and all classes of residents. There have been a number of deaths. Yellow fever is officially reported at Monterey and Nuevo Laredo, Mexico. Great precautions against this disease are being taken along the Texas border. Acting Assistant Surgeon Hamilton, at Laredo, under orders from Surgeon General Wyman, is cooperating with the State health authorities. Tentage and camp equipage for 100 people have been sent to Laredo by Surgeon General Wyman.

Bacteria as Purifiers of Sewage.—At a recent meeting of the British Institute of Sanitary Engineers, held at Wolverhampton, England, a paper prepared by Dr. J. C. Thresh and Martin Priest, on the distribution of sewage on bacteria beds was the principal subject for discussion. The writers pointed out that it was now generally admitted that in the processes of sewage purification bacterial action was the most important factor and that the condition and quality of a sewage effluent would vary according to the different bacterial influences to which the sewage had been subjected. From the point of view of sewage purification, bacteria were divided into two classes, viz., anaerobes and aerobes, the anaerobes producing putrefaction fermentation, while the aerobes produced the true putrefaction, and it was the aerobic bacteria that they must chiefly endeavor to cultivate and employ in their sewage schemes. If bacterial treatment was the main factor in sewage purification, the proper utilization of the bacteria beds was the crux of the whole problem. The best means for the distribu-

tion of sewage on bacteria beds were: First, the so-called contact beds, in which the beds are filled with sewage, allowed to stand a certain time, then run off, and the beds allowed to aerate; second, distribution by means of alternating siphons, with or without arrangements for distributing the sewage over the whole surface of the beds; and, third, the continuous, or sprinkler system. Many installations of the contact system for some reasons had not proved satisfactory. As regards aeration, the contact beds compared very unfavorably with the sprinkler bed; because, while the contact bed is alternately filled and emptied, the continuous, or sprinkler, bed worked under constant aerobic conditions, with always an ample supply of oxygen. In conclusion, the writers pointed out that the bacterial system of purification merely improved the sewage from a chemical standpoint, and left it nearly as impure as before from the bacteriological standpoint, and possibly, therefore, quite as dangerous, so far as disseminating germs of typhoid fever, cholera, and other water-borne diseases were concerned.

Purification of Water by Ozone.—At Wiesbaden and Paderborn in Germany good results are said to have been obtained in the purification of water by the use of ozonized air, water of an inferior quality having been turned into very good drinking water. The plant at Wiesbaden contains 48 ozonizers, forming duplicate groups of twenty-four each. A set of eight ozonizers receives an alternating current of 8,000 volts from a step-up transformer. One pole of the apparatus consists of the cooling water of the glass tube, and is earthed, while the other pole, connected to the transformers, is placed in an inaccessible position, and therefore causes no danger to the attendant. The ozonizing tubes are enclosed in a cast-iron case consisting of three parts: (1) A completely closed central portion, into which are firmly screwed the eight ozone tubes; (2) an upper part, acting as a reservoir and distributor of the air, and (3) a lower part, forming the ozone-collecting chamber. In the upper chamber, removed from all possible touch of the attendant, are fixed the terminals from the transformers. On the floor of the lower compartment are placed the high potential cylinders with their insulating glass rods, and in addition an automatic device to prevent a short-circuit through any leakage of the cooling water. This consists simply of a strip of filter paper stretched across a metal spring. If the filter paper gets moist it tears, the spring opens out and automatically puts that particular ozonizer out of use.

Medical Service in Battle.—The tactical lessons taught by the Spanish-American and the Boer wars have been much discussed, and these have suggested another question intimately connected with the tactics of the situation, and the solution of which is entirely dependent on these tactics, namely:

"What," writes the *Sun*, "have these wars taught as regards the medical service on the battlefield? In view of this intimate connection between the two, it is evident that the medical service should profit by the lessons learned in tactics, and regulate its work on the battlefield accordingly. The battles before Santiago, fought with small caliber rifles and smokeless powder, furnish no connected data for practical use in making tactical deductions; all considerations of the subject were more or less theoretical. But the Spanish-American, and more particularly the South African war helped to solve the problem. The American army was the first to make an attack on a battlefield which had no curtain of smoke to furnish cover or to mark the enemy's line and to advance against small caliber repeating rifles. The campaign was short, however, and the conditions limited, consequently the Spanish-American war furnished merely the initial data, while the South African war, with its great numbers, its variety of conditions and its examples of important battles, furnished a mass of material for the new tactics.

"A study of the experiences in these two wars shows that there are three principles of tactics developed by them which bear on the medical service in the field: 1. The movements of the attack have become much slower. 2. To obtain superiority of fire it has become necessary to remain much longer in the firing positions. 3. The battle begins at much longer ranges, and serious wounds are produced at far greater distances than formerly. All these affect the location of field hospitals, etc., and the work of the medical officer on the battlefield at various stages of the battle. The first is explained by the accuracy of the modern arm, the lack of cover to the attack, formerly furnished by the cloud of smoke, but above all by the invisibility of the enemy. As a British officer graphically expressed it: 'In a modern battle what affects the assailant most seriously is the emptiness of the battlefield.' The second principle results from the first, but has its own explanation, too. Superiority of fire depends on the relative effects on both sides, and, in spite of all improvements in firearms, it takes much longer now to gain superiority of fire, because of the great losses in the open; consequently, the attacking force must stay longer in its successive firing positions (under cover) before it can hope to advance to the next one. What requires but a few minutes in peace maneuvers will demand hours in time of war. The third principle results from the greater power of the modern arm. The successive firing positions will be the places where the wounded will accumulate, and there the surgeons will be particularly needed. But they will be in demand even at great distances, for target practice experience shows that at 1,000 yards a line of skirmishers can in five minutes put 35 per cent. of a similar line out of action, and, although the losses at this range, as shown in the last two wars, were less than this, they were still serious. As the ranges decrease the destructive effects rapidly increase. At 800 yards the cranium is perforated; at 500 yards the long bones are broken into pieces as small as a pea, and the adjacent muscles are torn away; and at 400 yards blood vessels are pierced or particles are torn from them, causing grave hemorrhages, often proving mortal. To avoid the moral effect of so many wounded the medical attendants must advance with the line to give aid. They can no longer remain beyond the zone of fire, but must go where they are needed. But it is evident that this corps cannot perform its work on the line of skirmishers, except during the pauses in the battle or when the objective of attack is changed. The troops themselves must therefore act on the line of skirmishers while the firing is going on, and for this purpose they are provided with their first aid packages. If any cover is available near the line the wounded will instinctively seek it, and there, too, the medical corps must come into action. These improvised stations can render provisional service, but they must be in communication with the field hospitals in rear, and the latter must be carefully selected for that reason. Cover is the main thing at first, and water, straw or bedding are secondary con-

siderations. In the Franco-Prussian war such cover was often found at 600 yards behind the principal firing line, but the modern gun has a much flatter trajectory than the needle gun of that day, consequently the protecting cover can be much lower. At 600 yards the projectile rises but 8 feet above the line of sight, and at 1,000 yards only 33 feet. For these reasons medical officers must be carefully trained in time of peace promptly to select proper cover for their stations near the troops, and must be in touch with the tactical situation in war in order to effect this intelligently. The slightly wounded must be rapidly transported to the rear, for it is a well-known fact that many of the wounds of the small caliber bullet heal rapidly; therefore the enemy will make every effort to capture the stations where they accumulate, in order to prevent their returning to the ranks in the near future. It is evident, therefore, that under the new conditions the medical officers must acquire a general knowledge of tactics, and in a battle must be informed of the general tactical situation, and they must also familiarize themselves with the proper use of cover. Their stations must be close up to the firing line and must be moved to the front continually in order to take proper advantage of the pauses in the battle. The most advanced stations will be improvised and will be determined by the troops themselves—the dead angles or places under slight cover, to which the wounded have crawled of their own accord. The others must be selected with reference to cover alone, and must be connected with the field hospitals arranged in rear and out of the limits of the zone of fire."

The International Association of the Medical Press.—A meeting of the Committee of the International Association of the Medical Press, writes the *British Medical Journal*, was held at Brussels on September 1, in one of the Committee rooms of the Belgian House of Representatives. The following countries were represented: Spain, Dr. Cortezo (President) and Dr. Monmeneu; France, Drs. Granjux and Blondel; Belgium, Dr. Déjace; Norway, Dr. Aaser; Denmark, Dr. Caroë; Portugal, Dr. Silva Carvalho; United Kingdom, Dr. Dawson Williams and Mr. Adolphe Smith. Regulations for the conduct of the business of the Committee were adopted, and it was resolved to bring the existence and aims of the Association under the notice of the editors of the principal medical journals in America, North and South. Applications were received from the directors of medical journals in Holland and Hungary, and the Committee decided to invite these gentlemen to take steps for the formation of national associations. The question whether a congress of the medical press should be held in Lisbon immediately before the International Medical Congress to be held there in 1905, or whether the Congress should be replaced by a general meeting of the International Association was considered, but a decision deferred until the next meeting of the Committee.

Obituary.—Dr. S. S. H. Stout is dead at Clarenden, Texas, at the age of eighty-two years. He was a native of Tennessee and served through the Civil War as Director of the Medical Department of the Confederate Army. Dr. Stout was graduated from the University of Nashville in 1842 with the degree of A.M., and in 1848 from the University of Pennsylvania with the degree of M.D. The honorary degree of LL.D. was conferred upon him at the University of Nashville in 1885.

Dr. Egbert Guernsey, the eminent homeopathic physician of New York, who died at his summer home in Fishkill Landing, N. Y., last Saturday, was born in Litchfield County, Conn., on July 8, 1823. He was educated in Phillips Academy, Andover, the Yale Scientific School, and the Medical College of the University of the City of New York, from which he was graduated with the degree of M.D. in 1846. Instead of beginning practice, he started the newspaper now known as the Brooklyn *Daily Times* and then as the *Williamsburgh Times*. While editing that paper he prepared two school histories of the United States, which were widely adopted as text-books. In the spring of 1849 he was appointed City Physician of Williamsburgh, and then began to give his attention exclusively to his profession. In 1850 he established his office in this city. Dr. Guernsey did a wide work in the literature of his profession. In 1855 he published "Domestic Practice," which has passed through eleven editions. He was associated with Dr. A. Gerald Hall in the publication of "Jahr's Manual," and was for years editor-in-chief of the New York *Medical News-Times*, which he founded in 1872. In 1870 he organized the Western Dispensary, which has since been connected with the Hahnemann Hospital, which he also helped to organize. He was also one of the prime movers in the organization of the Metropolitan Hospital, on Blackwell's Island, and gave constant service in the development of that institution. It was through his instrumentality that the old Inebriate Asylum on Ward's Island was converted into the Manhattan State Hospital under the direction of the Commissioners of Charity and Correction in 1877, and he was for many years the President of the hospital. He was for a long time trustee and at one time Vice-President of the State Insane Asylum at Middletown, N. Y., and had been President of both the county and State medical societies. Dr. Guernsey was one of the founders of the Union League Club, and at the time of his death was a member of that club; the Sons of the Revolution, the National Academy of Design, the New England Society, and the New York Historical Society, besides a number of medical and philanthropic organizations.

CORRESPONDENCE.

DR. ADAMI AND THE AMERICAN CONGRESS OF TUBERCULOSIS (CLARK BELL).

To the Editor of the MEDICAL NEWS:

SIR: Upon my return from abroad a few days ago, I learned for the first time that I had been announced as one of the Honorary Presidents of the American Congress of Tuberculosis (Clark Bell). This announcement had been made without my knowledge and had been communicated to the public press before ever I had been approached in the matter. After that communication (June 11) I find that I was addressed upon the subject (June 12). The notice, which I have before me, is in the form of a copygraph letter upon the flimsiest of yellow paper, dirty and badly folded, and is not to the effect that I had been appointed Honorary President, but merely a curt reference to an enclosed list of officers elected at a recent session, ending with the expression of the hope that I would accept. The enclosure consists of two columns cut out of the New York *Daily Tribune* which, it is true, contains my name (misspelled) on the list of Honorary Presidents. I am not in the least surprised that my First Assistant mistook the communication for a second-class adver-

tisement or something of the kind and never realized that it was matter which should be forwarded.

Under no circumstances would I have consented to allow my name to be connected with the organization in question. The employment of the name as that of an Honorary President is and has been wholly unauthorized and I have written asking that it be withdrawn.

I am, Sir,
Yours faithfully,
J. GEORGE ADAMI.

Pathological Laboratory, McGill University, Montreal, Sept. 18, 1903.

SOCIETY PROCEEDINGS.

THE NEW YORK ACADEMY OF MEDICINE.

Stated Meeting held Thursday, May 21, 1903.

The Vice-President, Charles L. Dana, M. D., in the Chair.

Symposium on Puerperal Infection.—The scientific business of the evening consisted of a series of papers read under the auspices of the Section on Obstetrics and Gynocology. The subject was a symposium on puerperal infection. The first paper consisted of a historical review of the subject by Dr. Brooks H. Wells.

Amelioration of Puerperal Conditions.—This paper will be published in a subsequent issue of the MEDICAL NEWS.

Pathology and Prophylaxis.—Dr. J. Clifton Edgar presented a paper upon this subject, which will be published in the MEDICAL NEWS shortly.

Intravenous Antisepsis.—Dr. Charles C. Barrows reported a series of cases of puerperal fever successfully treated by the injection of one-half liter to a liter of a 1-5,000 solution of formaldehyde. The cases originally reported by him have given rise to an extensive literature of the subject and this he reviewed to some extent. Drs. Park and Payne, of the New York Board of Health, have taken up the same subject experimentally on animals, and have shown that injections of formaldehyde are not curative when there are virulent streptococci in the circulation of rabbits. Dr. Barrows pointed out that rabbits were bad subjects for such experiments, since they did not, because of idiosyncracy, stand formaldehyle injections well, and besides, were especially susceptible to septic conditions. While Drs. Park and Payne's observations deserve the utmost consideration they must be judged only on their merits, and it must be borne in mind that there is no mention of the time allowed to elapse between the injection of virulent streptococci and the use of the formaldehyde solution.

Exaggeration of Danger.—A number of personal observations made by physicians shows that the introduction of formaldehyde solution into the venous circulation is not likely to cause serious symptoms. McGuire's experiments, done in London, particularly show that large amounts of formaldehyde may be taken into the system without danger. The cyanosis and syncope which have been reported after some injections may occur after intravenous salt infusion, and are not necessarily due to the formaldehyde. Too many observations have been made now for the objection of danger to have any great weight on the subject.

Technic of Method.—The median basilic or cephalic veins are snipped with a scissors in order to make an easy opening for the canula. A longitudinal opening made with a knife is not nearly so suitable for the purpose. Care must be exercised that the canula is not introduced into the sheath of the vein, but this accidental misplacement will be followed immediately by the production of a tumor at the site, and then can be corrected. The solution must be introduced slowly, and the patient's condition should be watched carefully, so as to avoid the production of syncope or any disturbance of the general condition.

Illustrative Cases.—Dr. Barrows reported some 14 cases from the practice of friends and brother physicians, an accident to his patella some three months ago having made it impossible for him to continue his observations with regard to it. In one case there was expulsive vomiting, a tender tympanitic abdomen, a temperature of 105° F., with a pulse of 150. This case looked surely fatal, yet after the injection of formaldehyde of 1-5,000, the temperature promptly dropped, and the patient continued to convalesce up to a perfect recovery. In another case a rapid rise of temperature took place on the sixth day after labor, which fell after curettement, but only to rise again this time to 105° F. An intraveneous injection with formaldehyde was given 1-4,000, and this was followed by a chill and by some cyanosis. The temperature fell, however, and rose again the next day to above 105° F., when another injection was given, followed by a drop of temperature without a subsequent rise. In certain cases a solution of formaldehyde stronger than 1-5,000 and even as strong as 1-2,500 was employed with good result. In several cases that yielded very nicely to formaldehyde injections, antistreptococcus serum had been faithfully tried without effect.

Specific Action of Formaldehyde Solution.—In a controlled case of puerperal septic fever, in which, instead of formaldehyde solution, normal salt solution was employed, the result was fatal and without the drop in temperature, which so invariably accompanies the injection of the formaldehyde solution. Sajous, in his recent book on the therapeutic action of glandular extracts, suggests that formaldehyde is a stimulant to the adrenal system. He quotes Dr. Barrows' cases and considers that the stimulation of the adrenals causes a distinct and demonstrable rise in the bacteriolytic action of the blood serum and other fluids within the body. To this, in Sajous' opinion, are to be attributed the good results obtained from the formaldehyde injections.

Frequency of Puerperal Fever.—Dr. William R. Pryor said that in spite of the discoveries in bacteriology that had made very clear just what the causes of puerperal fever are, quite as many women perish from the disease now as before its pathogenesis was known. It is clear that the affection is really a form of a lymphangitis, and that death is not due so much to the presence of germs in the uterus as to their absorption into the system when they occur in the heart, and even the brain and the kidneys. It is not so much the changes in the blood either that cause the fatality of the disease, and it is never the local lesions. The local lesions may be comparatively insignificant. If there is to be any remedy for the affection it will be found in some substance that will act as an antiseptic, follow the germs and their toxic secretions into the lymphatics and there neutralize them by direct destructive action.

Bacteria in the Abdominal Cavity.—By a series of observations made in cases of severe infection Dr. Pryor has succeeded in showing that streptococci are practically always free in the abdominal cavity. In certain cases where there were symptoms of beginning peritonitis in the pelvis Dr. Pryor has opened up and packed the posterior cul-de-sac with iodoform gauze. After such treatment no cocci were found to be present on the second or third dressing, though colon bacilli had found their way through the intestinal walls and were practically always present. The setting free

of iodine in the presence of the tissues, as happens when iodoform is brought in contact with a lacerated surface, or with a serous membrane, is the best antiseptic action that can be obtained, and brings about a rapid drop of temperature and pulse. The evidence of the absorption of iodine is to be found in its presence in the urine, which may usually be demonstrated in five hours and sometimes even in two.

Danger of Curettage.—Dr. Pryor thinks that an immense amount of mischief has been done by the use of the curette. Lymphatics that have been closed by nature's processes and are effectually preventing the progress of the septic condition are rudely opened up and made patulous by means of the sharp curette, and as the infected material is not entirely removed this proves a new nidus for infection for further septic processes.

Results with Iodoform.—Dr. Pryor has treated some 37 cases with iodine, with but one death. It is important that iodism should be secured, but this may be accomplished effectively even by the use of liberal amounts of iodoform ointment applied externally. Once iodism is obtained, not only is the mortality lessened, but the morbidity decreases very materially, and the convalescence of these cases, usually so tedious and so prolonged, with so many complications and sequelæ, is over in a short time, and patients promptly recover their normal health.

Condemnation of Curettage.—Dr. Herman J. Boldt, in discussing the operative treatment of puerperal fever, said that undoubtedly curetting is often a mistake and cannot be too severely condemned. It is only when the condition is due to saprophytic organisms, and not to pyogenic organisms, that instrumental cleaning out of the uterus is justified. On the other hand, repeated intra-uterine irrigation may be easily carried to such an extent as to add distinctly to the danger in milder cases of puerperal sepsis, without any additional safeguard being added adequate to the risk entailed. Minor surgical procedures, which used to be considered favorable in these cases, are now practically abandoned.

Uterine Extirpation.—Extirpation of the uterus is so serious a remedy that it can only be thought of in cases of puerperal sepsis, when there is reasonable assurance that the septic condition was limited to the uterus, and when treatment of any other kind has proved to be of no avail. Only in the gravest forms of the affection has it been practised and even then it has proved to give very little satisfaction. Whenever bacteria could be demonstrated in the circulation, the operation has always failed. A number of patients have died after the operation, even when the septic condition seemed limited to the uterus, and when no bacteria could be demonstrated in the blood. The time required for the operation must not be permitted to stand as an objection against it since, under favorable circumstances, the uterus may be extirpated in ten minutes and at times the operation has even been completed in six minutes.

Bacterial Diagnosis and Its Shortcomings.—At the present time nothing is more needed than some rapid method of deciding that bacteria are surely present in the blood. Under present conditions of knowledge and technic, at least twenty-four hours is required in order to demonstrate by cultures whatever bacteria may be in the circulation. This is entirely too long, and some method of deciding so important a question, even by a few hours, must be found, if bacteriological diagnosis is to be of real assistance to surgery. There remains the question of the abdominal or vaginal route for operation. The latter should be chosen unless the uterus, as is often the case, proves to be too large for removal in this way. Of course, precautions must be taken that in the removal of the uterus infective material is not spread over other portions of the pelvis. If the broad ligaments are affected, then the operation should be done through the abdomen. Trendelenburg has reported some good results by following this method. If the uterus is large and boggy, then, as a rule, removal should not be undertaken, but the decision must ultimately depend upon the patient's condition.

Not Treatment but Prophylaxis.—In opening the discussion, Dr. Egbert Grandin said that he doubts if there has been any sure advance in recent years in the treatment of puerperal infection. Whatever improvement has come has been in the matter of prophylaxis. Otherwise, for twenty-five years, obstetrics has been at a standstill. This has not prevented surgical interference of the most varied kind, however, and undoubtedly harm rather than good has been done, as a rule. Those who have been readiest to interfere actively for the treatment of the condition have been least careful to differentiate the various types of puerperal infection before beginning treatment. The putrefactive varieties of puerperal sepsis are rarely fatal unless the pathological processes in the uterus are needlessly interfered with, nature's protective mechanism broken down, and the resistive vitality of the patient lowered by uncalled for remedial measures.

Danger of the Curette.—In 1886 Dr. Grandin read a paper recommending the use of the curette for certain conditions of puerperal infection. Many editors commented upon it, and portions of it, at least, were printed in many parts of the country, evidently attracting a great deal of attention. Undoubtedly, it has been a source of much more harm than good. In the case of retained remnants of the placenta and secundines the curette is not nearly as useful as the finger. The use of the curette opens the lymphatics, brings about the diffusion of septic material, and makes the cure of the condition impossible. The hand will do all that is needed in these cases and without any of the risk of causing damage almost inevitably incident to the employment of the curette. A good general rule in the treatment of these infections is avoidance of local treatment. The less that is done locally the better. The methods suggested by Drs. Barrows and Pryor, by which an effort is made to have an antiseptic follow the infected material into the tissues or neutralize it in the circulation, is undoubtedly the principle of rational therapeutics that will eventually prevail in this matter. The results obtained by them are very encouraging. Yet it must not be forgotten that the severest and most hopeless-looking cases of puerperal sepsis sometimes get better unexpectedly, without the employment of either of the methods suggested, and, in fact, without any treatment at all.

Operative Interference.—Whenever there is pus present in the pelvis it should be evacuated. This is the simple rule of all rational surgery. Beyond this, however, operative intervention is almost sure to do harm rather than good. Dr. Grandin confesses to being guilty of having done hysterectomy twice in puerperal sepsis. To be of any avail this should be done very early. As a matter of fact, the time for doing hysterectomy when there is hope of its being successful is so early in a case that there is very little prospect of the operation ever being really undertaken in time. Surgery in puerperal fever has been entirely too radical and too ineffective. What is needed is some agent, such as Dr. Barrows and Dr. Pryor are making their observations with, that will, if possible, follow the streptococci in its invading course to the lungs, the brain, the heart, and the kidneys of the patient.

Prognosis not Absolute.—Dr. Henry C. Coe said there is no absolute prognosis of any individual case of

puerperal fever. At Bellevue, as is well known, the worst looking cases, that apparently have come in moribund, sometimes unexpectedly recover. Dr. Coe has seen ordinary intravenous salt solution injections given to a moribund patient, as a last resort, produce a drop of temperature from 104° to 98° F., without producing a chill. The temperature remained down for many hours, and was again lowered by salt solution injection. Hysterectomy is in theory indicated in cases where the localization of the infection is limited to the uterine tissues, but it is practically impossible to obtain an indication for the operation early enough in such cases to reduce the theory to successful practice.

Prompt Treatment.—Dr. Simon Marks said that the most important element for the successful treatment of puerperal fever is undoubtedly its early recognition. When the practitioner finds that the temperature has gone up in a puerperal patient, he hesitates to admit that there can be any puerperal infection. Other sources of fever are thought of first and treatment for supposed infection is allowed to drag along for some time. The practitioner hesitates to ask for consultation and the result is that when a consultant eventually is called the woman is usually moribund. There is no doubt that there will be some morbidity from puerperal infection, even in the best hands. If the practitioner is ready to admit this, cases will not be neglected until it is too late. Every case that presents a temperature above 100° F. should be considered serious, and if the uterus is cleared out sufficiently early there will often be an end of the danger.

Too Much Deprecation of Curette.—Dr. Marks considers that just as there was an exaggeration in the use of the curette, so now the reaction against its use is going too far. Personally, Dr. Marks does not fear the use of the curette, and considers that in expert hands it is much safer than the finger. Often the cervix is so closed that the finger cannot be inserted, or is not able to reach portions of the cornua of the uterus, which are readily reached by the curette. At times the localization of infectious material seems to be entirely on the inner surface of the uterus where it can be removed. If promptly treated, prophylaxis is, of course, much more important than treatment. Good, ordinary cleansing of the hands of the obstetrician is, however, almost more important than any of the more recently introduced and highly praised methods of aseptics. The use of gloves, for instance, has not given much difference to the morbidity of puerperal patients, as compared with the best results obtained before their use. In some 60 cases delivered with gloves there were some 24 per cent. morbidity.

Old-time Treatment.—Dr. S. W. S. Toms, of Nyack, said that there has been very little improvement by the introduction of new-fangled methods of treatment. At Bellevue, in the old days, opium was used freely and the statistics of recovery were quite as good as at the present time. After all, the patient's restfulness in these cases prevents the dissemination of infectious material very probably, and increases vital resistance by lessening fear and anxiety as to the result.

MEDICAL SOCIETY OF THE STATE OF PENNSYLVANIA.

Fifty-third Annual Meeting held at York, September 22, 23 and 24, 1903.

FIRST DAY—SEPTEMBER 22.

The Society was called to order by the President, Dr. William M. Welch, of Philadelphia. Rev. E. T. Jeffers offered prayer. Hon. M. B. Gibson, Mayor of York, then welcomed the members of the Society to the city. He dwelt on the early history of the town, there now being manufactories instead of the historic buildings of the Revolutionary period when the Continental Congress met on the site of what is now the Colonial Hotel, the headquarters of the Society. The city now has absolutely pure, filtered water, and is soon to instal a sanitary sewage system at a cost of $400,000.

A brief address of welcome was then extended by Dr. N. C. Wallace, President of the York County Medical Society.

The presentation of the program by Dr. I. C. Gable revealed several departures from those of previous meetings. This was the first meeting of the Society held under the new rules, which provide for the transaction of business by an executive council. Advantage was also taken of a recent by-law to hold Wednesday's and Thursday's morning sessions in two sections, this being necessitated by the large number, more than 80, of papers presented. The annual addresses were all given on Tuesday afternoon.

Dr. J. N. McCormick, of Bowling Green, Ky., representing the American Medical Association, was given the privilege of the floor and made a very strong appeal for a more thorough organization of the profession. Up to this time only the surface has been touched There are probably 120,000 physicians in the United States, and only 30,000 of them are members of any society. A united profession is hindered by the petty jealousies and constant warring of neighboring practitioners, doctors being at peace with every one except their own clan. Malpractice suits are aided in this way and ofttimes necessary surgical work is not undertaken because of fear of the outcome and the stock made of it by fellow physicians. Speaking of handling men who drift into bad methods, Dr. McCormick told of one who, after trying every other means, they made president of a county society. This put him on his mettle and he finally became a respectable practitioner. A valuable feature of organization is the power it gives the older men to watch over the younger ones.

The remainder of the forenoon session was devoted to the reports of officers, committees, etc. The Secretary reported a membership of 3,665, a gain during the year of 145.

Address in Surgery: The Individual Equation of the Patient in Surgical Operations.—Dr. W. L. Estes, of South Bethlehem, said that operations themselves give very little concern these days, but occasionally a death occurs when an apparently ideal operation has been performed. Other patients, though outwardly less favorable, get well. These occurrences suggest that there is an average vitality among patients and that this is determined by several factors. These should be carefully studied. Among the conditions that affect the reaction of the individual to traumatism are heredity, environment and habit and the physical condition of the patient. The question of heredity is a complex one as probably no disease other than syphilis is directly transmitted to offspring. But tendencies are transmitted, a peculiarity of cells, a chemical individuality, so to speak. This makes for or against vitality of the patient. Dyscrasias are thus transmitted and low resistances of cells to noxious influences or low power to produce antitoxins result in deaths from low grades of sepsis. Under environment Dr. Estes made a point that is rather opposed to previous beliefs. This was that the baleful effects of bad sanitation are by no means confined to the city and town. Conversely, he states that town or city-bred people stand operations better than do the average farmer. The fresh air and plentiful food of the latter are to a large extent nullified by overcrowding in sleeping apartments and by eating poorly cooked food. The physical condition of

the patient is often the turning point in a case and a thorough examination by the surgeon himself or by a competent aide should be insisted upon in every case. Taking physical examination to include the urine, it is of greater diagnostic value than laboratory methods. But the two should be combined.

Address in Obstetrics: X-ray Treatment of Uterine Cancer and the Etiology of Eclampsia.—Dr. John G. Clark, of Philadelphia, reviewed the above subjects. He spoke of the mortality from uterine cancer and the efforts being made in the line of earlier diagnosis. But 50 per cent. of the cases, as seen in a clinic, are already inoperable. Any method that promises results in these cases should be given a thorough trial. The action of the X-ray is still problematical, though it is probable that the healing effect is more in the line of stimulation. No one person has had sufficient experience to be an authority on the effect of X-ray treatment and the opinions of two classes must be combined—those that are skilled in the application of the X-ray and those who observe the preceding and subsequent history of the patient. Dr. Clark has had a limited personal experience in the use of the X-ray, but from it and from a careful review of the literature he draws the following conclusions: (1) No operable case of cancer of the uterus should be temporized by the use of the X-ray; (2) local therapeutic agents are practically valueless; (3) even in inoperable cases there is a very remote hope of cure and there is almost sure to be relief of pain; (4) the X-ray is on a sufficient basis and promises enough that this method of treatment should be thoroughly investigated. The principal point brought out in regard to eclampsia was that recent investigations throw doubt on its origin in the kidney alone, acting rather as a general poison.

Address in Hygiene and State Medicine.—Dr. Seneca Egbert, of Philadelphia, pointed out some of the results that have already accrued from recent investigations in these lines and gave a forecast of what may be expected in the future. The paper was largely a statistical collection of facts regarding the lowered mortality of the present as compared with the preceding decade. The agencies of preventive medicine have very largely benefited the people; especially those of cities. Philadelphia and Pittsburg do not show the decreased death rate they should and have been especially negligent in vaccination and the prevention of typhoid fever. The need of educating all the people in sanitation is paramount. State Boards of Health need the unanimous support of the public. The vital statistics recently asked by the government should be rigidly supplied. School children should be taught far more than at present concerning sanitation, quarantine, heredity, environment, need of fresh air, parks, proper occupations, etc. The course in physiology and hygiene should continue until they leave school.

Address in Neurology: Insanity.—Dr. Charles B. Mayberry, of Retreat, criticised the treatment of the insane under present methods. All varieties are placed together, though he has never seen good results from contact of patients. The family physician has a great part in preventing insanity. He it is who watches over children during their development and sees the adult before the outbreak of insanity. A history of insanity in the family should cause particular attention to the child or even adult during critical periods of its life. Of 600 admitted cases there was a family history of insanity in 163. Danger signals should be recognized. The present condition in state hospitals tends to prolong attacks of the condition. Dr. Mayberry would suggest: (1) An extended course of instruction in clinical and didactic psychiatry in our medical schools; (2) the erection of small psychopathic hospitals throughout the state for the treatment of acute, curable cases. Pennsylvania would need six of these; (3) with each one of these should be maintained an outpatient department, in order to keep under observation for one year every patient that was discharged; (4) the establishment of a central pathological laboratory for the further study of the condition. It is being more and more recognized that the pathology of insanity is the pathology of the entire body.

Address in Ophthalmology.—Dr. E. B. Heckel, of Pittsburg, traced some of the history of this branch which is almost as old as medicine itself. Ophthalmologists have been accused of using the same old drugs—mercury, silver nitrate, and atropine. This is true, but each has undergone marked improvement in the method of use. American ophthalmologists are considered to be the equal, and in some respects, the superior of those of Europe. The relation of the ophthalmologist to the profession and to the laity was discussed. His position in the profession is secure. His standing among the laity will largely depend upon the actions of the general practitioner, as to whether he sends patients to reputable or incompetent men.

Address in Medicine: Treatment of Pulmonary Tuberculosis at White Haven.—Dr. H. M. Neale, of Upper Lehigh, gave a description of the methods of feeding, exercise, rest, sun baths, etc., as employed at the White Haven Sanatorium. These are essentially the same as those which appeared in the MEDICAL NEWS a few weeks since.

Is There a Medical Profession?—Dr. T. D. Davis, of Pittsburg, said that this question seemed unnecessary, but furnished much evidence to prove that it is a pertinent one. He referred particularly to the lack of organization, although there are societies of all sorts. An authoratative body is yet lacking.

The Importance and Necessity of Industrial Hospitals.—Dr. W. B. Lowman, of Johnstown, after an experience of sixteen years with such an institution, accords it hearty praise. By industrial hospitals he means those connected with manufacturing or industrial establishments containing large numbers of workmen that are liable to injury. They are intended to receive accident cases only. The one in question is maintained by the Cambria Iron Company. At first it had but 12 beds and during the first year it was used for 32 in-patients and 363 ambulance cases. There are now 40 beds and last year there were treated 604 in-patients and 3,104 ambulance cases. There are two points in its favor—it is just and humane to the men, and it pays as a business investment. The sooner accident cases are attended to the better for every one concerned. At the hospital everything needed in an operation is at hand. At a private house nothing is ready for the surgeon. Employees come to entertain a better opinion of their employer and thus is brought about a better understanding between capital and labor. Litigation is diminished. To organize these hospitals the business side of the question must be presented to the corporation. The humanitarian side has been too much emphasized. The average cost of the hospital mentioned has been 85 cents per patient per day.

The Medical Expert Witness.—Dr. G. W. Wagoner, of Johnstown, spoke of the difficulties besetting the expert medical witness and offered pertinent advice concerning his actions. The difference between a common and an expert witness is a great one, yet attorneys deny that experts are advisers to the courts. Hired experts give conflicting testimony and the truth is covered over, instead of being made clear. The jury throws all of the testimony out and experts are discredited. Another difficulty is that the courts do not distinguish between *physicians* as experts. Often no

classification according to school, length of time since graduation, etc., is made.

Further Reflections on State Medical Board Examinations.—In answer to criticisms, Dr. A. O. J. Kelly, of Philadelphia, reaffirmed his opinions as embodied in an article read at the meeting of 1902.

(To be Continued.)

SPECIAL ARTICLE.

BYWAYS OF MEDICAL LITERATURE.—XVII.

PULSE BEATS AND MUSICAL RHYTHM.

In the *Popular Science Monthly* for September there is an article on Pulse and Rhythm, by Mary Hallock, that is calculated to be of great interest to physicians. Miss Hallock calls attention to the fact that from the earliest times there has been an impression abroad in many minds that rhythm in music was somehow associated with the pulse beat of ordinary human existence. This idea has been repudiated as visionary, yet there would seem to be good basis for the idea in all kinds of music, the ultra-classical, as well as the most familiar melody, the most solemn church chants as well as the hackneyed rag-time.

The majority of Beethoven's sonatas, for instance, are written to a metronomic notation of 72 to 76 beats to the minute, almost exactly the average number of the human pulse in health. All of them are within the limits of pulse variation, written to metronomic notation of from 58 to 81, being exactly the limits of the pulse during the physiological rhythm of daily metabolism. Seventeen bandmasters, consulted as to the rhythm to which they kept their music, answered from 64 to 72 beats per minute, which corresponds closely to the average pulse rate and bears a definite relation to the fact that this is about the number of steps per minute that bodies of men take with least fatigue and with the greatest satisfaction. Both facts may then be unconscious tributes to the influence of the cardiac rhythm within making itself felt in brain processes.

The musically inclined will find by consulting their pulse beats that a whistling street-urchin or a jangling hotel piano is giving forth a succession of sounds, the emphatic notes of which correspond very closely with the pulse beats. The doxology and "Yankee Doodle," far apart as they would seem to be in musical and ethical relations, have the physical quality in common that the successive beats in the music follow one another at intervals of a second, thus corresponding to the pulse rate. On the other hand Chopin, of nervous temperament and suffering during the period of his greatest productivity in music from the slowly progressing pulmonary tuberculosis that eventually carried him off, wrote his great set pieces to a metronome running at over 80 per minute—thus reflecting perhaps his physical condition and the pulse beat in his cerebral arteries, which, in his condition, was constantly higher than normal.

Miss Hallock suggests that this correspondence of pulse beat and music rhythm may be really a case of cause and effect. The objection, of course, might be made that any such influence is entirely unrecognized, but it is well-known that factors, even of importance, constantly acting upon the senses may come to be neglected and the same thing may easily happen with regard to the arterial wave and its influence on the brain, yet the result of that influence be clearly manifest in some direct or indirect outcome of brain activity that occurs as a consequence. The whole question is one of those highly interesting physiologico-psychological problems that deserves to be studied more carefully than in the past, for it has within it the promise of interesting relationships hitherto unsuspected.

THE PHYSICIAN IN LITERATURE.

A number of young physicians have recently attracted attention by their success in the field of literature. One of the latest to come to the front is Dr. Archibald Stodart-Walker, rather well-known before this for his valuable investigation in psychology and neurology, published under the title of "Researches in the Reaction Time of Touch, Light and Thought" and his monographs on "Hysteria in the Male," "Hypnotism" and "Crime Habit and Control." It seems to be quite the proper thing for neurologists and psychiatrists to dabble in literature, and we have, of course, some distinguished examples on this side of the water. Dr. Stodart-Walker's first venture came many years ago when he was only a little over ten years of age, yet he assisted in editing and wrote, it is said, a number of the verses in the Scottish Students' Song Book. In recent years the doctor has been rather widely known to the literary world because to him was committed the preparation for publication of the Journal Letters and other remains of his gifted uncle, the well-known professor, John Stuart Blackie, of the University of Edinburgh.

Dr. Stodart-Walker's venture into the realm of pure literature is a book with the rather striking title "A Struggle for Success." The author describes it as a study in Social Compromise, Expediency and Adaptability. A recent critic in the Edinburgh *Scotsman* describes the book as striking but also alarming, in that the Doctor states so forcibly certain of the social tendencies of the time. Some of the Doctor's views in social affairs are conventional to a degree seldom expressed in print. This is especially true of his attitude as regards morals and marriage, and his description of hypocrisy of the present generation with regard to many of the things it is supposed to hold dear while nothing really counts for it in the struggle for success except the getting there at any cost. It seems not unlikely that Dr. Stodart-Walker's position as a neurologist and the closeness of his association with a large number of people because of his professional career has given him an insight into social conditions much farther below the surface than is possible for the ordinary man whose occupations rather take him away from the opportunities for such study.

Among the other distinguished Edinburgh authors of to-day is the daughter of the distinguished Sir James Y. Simpson of chloroform fame. Miss Eve Blantyre Simpson's name will be familiar to not a few American readers because of her book "Robert Louis Stevenson's Edinburgh Days." Miss Simpson is a great lover of the country and is devoted to animals, one of her most read books being "Dogs of Other Days." She has inherited not a little of her father's taste for scientific pursuits and her literary work has taken the form of studies in folk lore in the historical traditions and legends of Scotland and on these subjects she is a frequent contributor to the *Scotsman, Blackwood's* and *Chambers'* magazines.

A very recently published novel, by a medical author, that is attracting no little attention having, it is said, gone into its second edition before the announced date of its publication, is "The Third Degree," by Dr. Charles Ross Jackson, of New York city, though there is no evidence on the title page to indicate the fact that the author is a member of the profession. Novel readers who keep up to the times in fiction, and hard enough it is, will recall with pleasure one of the successful books of last year, "A Daughter of the Pit," written by Margaret Doyle Jackson, who is the wife of the

writer of the present novel. Mrs. Jackson's book published by Houghton, Mifflin & Company, went through a number of editions and received a full meed of praise from the critics of the country generally. Dr. Jackson's book, published by Dillingham, promises to be at least as great success, and will be an almost unique example of conjugal talent for novel writing developing on both sides, long after marriage. This is an interesting melodramatic story with a murder and poisoning case, the poisoning being done by one of the recently discovered synthetic products, whose name is concealed because the legal authorities of the story consider it advisable not to put such a dangerous weapon as this into the hands of the public. As the interesting fact is brought out, that when an alcoholic solution of the drug has dried in spots it may be made to detonate, the mystery is perhaps not so deep for those who are more or less familiar with chemicals. The story is a clever one and will doubtless have many readers.

THE OUTLOOK IN SANITARY SCIENCE.

In an article in the *Booklover's Magazine* for August, 1903, on the lengthening of human life and the victories of modern medical science, Dr. Joseph Walsh, of Philadelphia, sets forth the promising outlook in sanitary science, especially with which the twentieth century opens. Scientific medicine is only in its infancy. Its progress will prolong more and more markedly the average age of life by removing the diseases that play havoc during childhood and adolescence. Cholera infantum, the terror of mothers during the second summer, has within the year delivered up its cause to a medical student, Duval, of the University of Pennsylvania, working under the direction of Professor Flexner. With the examples of Vienna and Munich before us, we realize the fate of typhoid fever, which proves the pitfall of many an ambitious adult. With typhoid will disappear its most notable sequelæ, gall-stones. Thumbs were turned down twenty years ago on the animal parasitic diseases, such as trichinosis and tapeworms, when the late Dr. Joseph Leidy, of Philadelphia, entered the lists and demonstrated how easily they might be conquered.

When the organisms themselves cannot be directly handled the source of contagion will be learned and the diseases thus avoided. Our now constant enemies, tonsillitis, influenza, and tuberculosis, will find it impossible to progress when people realize the uncleanliness of handkerchiefs and come to the use of paper napkins. Diphtheria and whooping-cough, and, probably other diseases, will have one source of contagion removed when pet dogs and cats are kept away from children or carefully held within doors. Inventions outside the problems of medicine will be by no means without influence. We have every reason to believe from analogy that flies are a frequent medium of transferring contagious diseases. Flies breed practically only in stables and the replacing the horse by the automobile means their extermination. In thus depicting the advance of medical science and predicting its ultimate triumph over disease are we anticipating a millennial condition? No, decidedly not. It is only a picture of the end of our present century when man will accomplish his four score and ten in comparative freedom from the disease hobgoblins of to-day. There are those who may think the prophecy too sanguine. Undoubtedly, however, if the promise of the last few years is fulfilled this much may be conservatively anticipated.

A COUNTRY PHYSICIAN AND THE OPPORTUNITY.

A writer in the New York *Independent* calls attention to the fact that the Pope's physician, who has proved so capable under the trying circumstances of taking care of a nonogenarian, was originally only a practitioner in one of the country towns on the eastern coast of Italy. When the late Pope's preceding physician died there was not a large number of medical men from whom his successor might be selected. All the Italian medical men who are attached to the Italian universities have taken the oath of allegiance to the Italian government, which is considered to be a usurping government by the popes, and consequently are unavailable for the position. Dr. Lapponi, who was practising in a little town not far from Ancona, happened to have been called as the physician of a cardinal who was staying on the east coast of Italy during one summer for his health. The cardinal was very much taken with Lapponi's ways, and especially with his common sense views with regard to care and nursing, rather than drugs as the mainstay for patients advanced in years.

When Pope Leo was looking around for a successor in the office of papal physician this cardinal was very close to him in certain important matters of state, and was consulted with regard to the choice that should be made. He suggested the name of Lapponi and gave such good accounts of his success in his own case that without more ado Pope Leo selected him as his physician. To the surprise of the country practitioner there came to him one day a messenger from Rome with the formal document appointing him physician to the Pope. It was totally unexpected and came as a complete surprise. For a time Lapponi suspected that some of his medical friends might be playing a practical joke on him, but a little inquiry elicited the fact that the documents had come through perfectly regular channels. Lapponi made his way to Rome and was formally welcomed and installed in his position.

He proved in many ways to be the right man in the right place. Leo XIII had always been delicate, but that very fact had made him extremely careful with regard to his health and had made him very ready to follow the slightest suggestion of his physician. Besides he was a man eminently abstemious and not likely to go to excess in any way, except as regards the amount of work he would insist on doing. This was the one difficulty his physician had to encounter, and no directions, however positive, were sufficient to keep the Pope from overworking at certain times. Only once was there a decided difference of opinion in other matters between the Pope and his physician. Pope Leo had lost several teeth when he was considerably over eighty. One of the Cardinals suggested he might very well replace them by a set of teeth made for the purpose. The Pope announced one day to Lapponi that he was about to have himself fitted with a complete new set of teeth. His physician at once objected, and said that if His Holiness had a new set of teeth he would almost surely be tempted to eat things that would not agree with his old stomach. The Pope saw the wisdom of this, and did not get the teeth.

Many of the old nobility in Rome, who have remained faithful in their adherence to the Pope, became the patients of the new Papal physician. The medical men of Rome generally, however, were very ready to admit that Lapponi had not abused the prestige of his position, nor lowered its professional dignity in any way, and that he had indeed proven himself equal to the opportunity which had been so unexpectedly presented to him.

MEDICINE IN SHAKESPEARE'S TIME.

In a recent number of the *Westminster Review* Dr. John Knott discusses the medical knowledge of Shakespeare. He says that not many allusions to the anatomy

and surgery of the skeleton are met with in the works of the great dramatist. He quotes two or three such references, however—one of which is of special interest. In the *Winter's Tale*, Autolycus calls out that he fears his "shoulder blade is out." Dr. Bucknill's commentary on this passage is an *ex cathedra* pronouncement that "the shoulder blade cannot be dislocated." On this Dr. Knott makes the interesting observation that "as in so many cases where commentators have undertaken to amend Shakespeare, the great poet is quite in accord with the most advanced knowledge of this subject in the present day, while the critic is absolutely wrong." Dr. Bucknill's mistake he attributes to the fact that in the ordinary text-books of the early portion of the last century dislocations occurring at the joint between the shoulder blade and the collar bone were always spoken of as dislocations of the clavicle, as the projecting extremity of that bone produced the resulting deformity. Of muscles as distinct entities in the human framework Shakespeare appears to have had no knowledge whatever; this is not surprising, as the Italian universities were then the only places in which anatomy was systematically studied. Shakespeare's vague use of the terms "nerve" and "sinew" show that he shared the indefinite ideas of his time. Hazy ideas of the circulation had existed among anatomists and physiologists before Harvey was born; and several passages of Shakespeare seem to Dr. Knott to show that Harvey's discovery, which was published after his death, would not have been a startling novelty to him if he had lived. The most definite expression on the subject he finds in *Coriolanus*, in the famous parable of the belly and the other members of the body. The stomach, after describing itself as the storehouse of the food received into the body, says:

I send it through the rivers of your blood,
Even to the court, the heart, to the seat o' the brain;
And through the cranks and offices of man,
The strongest nerves and small inferior veins
From me receive that natural competency
Whereby they live.

"If," says Dr. Knott, "this passage does not indicate a distribution of the pabulum by the circulating fluid to the various tissues of the body, distinctly foreshadowing the outline of what is known at the present day, I cannot suggest any other interpretation." After citing a number of instances of Shakespeare's references to matters connected with medicine, Dr. Knott justly points out that medical knowledge in the strictest sense did not exist in Shakespeare's day. "But when it comes to description of symptoms which may be observed at the bedside of the sick or dying, and which, the human organism being the same then and now, are familiar to every practising physician, we find them recorded by the dramatist with a vivid accuracy which cannot be surpassed." Dr. Knott's paper is an example of the blending of medical knowledge with literary taste which we are always glad to welcome in the members of our profession. Literature of the right kind enlarges and deepens human sympathy, which is apt to become shriveled and hardened if exposed too exclusively to the dry light of Science.—*British Medical Journal.*

BOOK REVIEWS.

STUDIES IN THE PSYCHOLOGY OF SEX. Analysis of the Sexual Impulse; Love and Pain; the Sexual Impulse in Women. By HAVELOCK ELLIS. F. A. Davis Company, Philadelphia.

THE author is recognized as one of the most able and careful students of the subject of this small volume. He is sound and thoroughly acquainted with an extensive literature that is neither prurient nor obscene.

He here presents three studies, parts of which have appeared in other places, all of which are worthy of study by those called on to deal with problems of sex, and what physician is not?

The analysis of the Sadistic and Masochistic phenomena is especially able and thorough.

These books are not for general reading, but they are valuable to the true student.

INTERNATIONAL CLINICS: Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles on Treatment, Medicine, Surgery, Neurology, etc. By Leading Members of the Medical Profession Throughout the World. Edited by A. O. J. KELLY, A.M., M.D., Philadelphia. Volume II, Thirteenth Series, 1903. J. B. Lippincott Company, Philadelphia.

THIS second volume of the International Clinics under its new editor fulfils the promise of its predecessor. There is an excellent symposium on the summer diarrheas of children, which begins with a biological discussion of milk bacteria and intestinal disorders by H. W. Conn, of Wesleyan University. Among the important articles of the volume may be noticed "Practical Notes on the Prophylactic and Curative Treatment of Influenza, Malaria, Erysipelas and Ozena," by J. McFadden Gaston, of Atlanta; "The Rest Treatment, When Indicated and How Conducted," by J. Madison Taylor, of Philadelphia; "The Etiology, Prevention and Treatment of a Common Cold," by Alexander Haig, of Edinburgh, Scotland, and the "Causation and Treatment of Sterility in Women," by Dr. J. Riddle Goffe, of New York City.

ON SYPHONAGE AND HYDRAULIC PRESSURE in the Large Intestine with Their Bearing upon the Treatment of Constipation, Appendicitis, etc. By RALPH WINNINGTON LEFTWICH, M.D., Late Assistant Physician for the East London Children's Hospital. Author of "An Index of Symptoms," etc. William Wood & Co., New York.

DR. LEFTWICH has conceived the idea that the large intestine works on the principle of the syphon. The first paragraph of the book is as follows: "Many centuries have passed since the large intestine was described and many thousands of anatomists have examined it closely. Among them some must surely have marveled that a mechanism so ill-adapted to an erect being could do its work so well. There is a key to the problem, but without the key nothing could well appear more faulty than the design." The key, according to Dr. Leftwich, is the fact that the long arms of the ascending and descending colon act as a syphon. The new theory has some interesting practical features that are well brought out.

BOOKS RECEIVED.

The MEDICAL NEWS *acknowledges the receipt of the following new publications. Reviews of those possessing special interest for the readers of the* MEDICAL NEWS *will shortly appear.*

TEXT-BOOK OF THE DISEASES OF WOMEN. By Thomas A. Ashley, M.D. 8vo, 661 pages. Illustrated. Williams & Wilkins Company, Baltimore.

MANUAL OF THE DISEASES OF THE EYE. By Charles H. May, M.D. Third edition. 12mo, 408 pages. Illustrated. Wm. Wood & Co., New York.